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Army Third Party Contracting

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Preparing Technical Requirements for Third Party Contracting of Army Facilities

by
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This report describes how to prepare the technical requirements portion of a Request for Proposal (RFP) for facilities acquired under Third Party Contract (TPC) arrangements. Included are: a discussion of the several TPC approaches authorized by Congress; identification of conditions occurring in a facility project that will impact the content and composition of technical requirements; direction in determining the appropriate content and composition of technical requirements consistent with project-specific conditions; and a source document for design, engineering, and construction criteria to be referenced in the development of a TPC RFP.

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FOREWORD

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CONTENTS

	Page
SF 298	1
FOREWORD	2
1. INTRODUCTION	5
1-1. Background	5
1-2. Purpose	5
1-3. Approach	5
1-4. Scope	6
1-5. Mode of Technology Transfer	6
1-6. References	6
2. DESCRIPTION OF TPC METHODS/VARIATIONS	7
2-1. General	7
2-2. Description of TPC concepts	7
2-3. Outleasing—2667	8
2-4. Long-Term Facilities Contracts—2809	10
2-5. Build/Lease of Military Family Housing—2828	14
3. FACTORS AFFECTING DEVELOPMENT OF DESIGN AND TECHNICAL REQUIREMENTS	19
3-1. General Considerations	19
3-2. Major Project Conditions Affecting Technical Requirements	19
3-3. Impacts on TPC Technical Requirements	19
4. CONTENTS OF TECHNICAL REQUIREMENTS FOR THIRD PARTY CONTRACT REQUESTS FOR PROPOSALS	24
4-1. General	24
4-2. Architectural	24
4-3. Substructure	26
4-4. Structural Frame	28
4-5. Roof Construction	30
4-6. Exterior Closure	32
4-7. Interior Construction	34
4-8. Interior Finishes	36
4-9. Specialities	38
4-10. Plumbing	40
4-11. Heating, Ventilation, and Air Conditioning (HVAC)	43
4-12. Special Mechanical Equipment	46
4-13. Interior Electrical	49
4-14. Special Interior Electrical	52
5. PREPARING TECHNICAL REQUIREMENTS FOR THIRD PARTY CONTRACT REQUESTS FOR PROPOSALS	54
5-1. General	54
5-2. Design and Construction Criteria Sources	54
5-3. Design Requirements	55
5-4. Building Design Criteria Sources	56
5-5. Engineering and Construction Requirements	57

CONTENTS (Cont'd)		Page
	5-6. Specification Format	57
	5-7. Engineering and Construction Criteria Sources	58
6	CONCLUSION	60
	APPENDIX A: Engineering and Construction Criteria Sources	61
	APPENDIX B: Recommended Design Requirements Format	141
	ACRONYMS	146
	DISTRIBUTION	

PREPARING TECHNICAL REQUIREMENTS FOR THIRD PARTY CONTRACTING OF ARMY FACILITIES

1. INTRODUCTION

1-1. Background

Third Party Contracting (TPC) for facilities and related services is a relatively new concept to the military. Under this arrangement, private sector financing (PSF) is used to design, construct, operate, and maintain facilities that are then leased to the government or operated by the private venture to provide necessary services to the Army. Successful execution of TPC projects will benefit the Army by providing facilities or services outside of the Military Construction, Army (MCA) funding limitations, while also providing economic incentive to private design and construction ventures.

Legislation allowing the military to enter into long-term facilities contracts with private entrepreneurs was recently passed. Five test projects were authorized for each of the military services, and all contracts were to have been awarded prior to 30 September 1989. However, due to the complicated nature of these contracts, several of the projects have not yet been awarded and the legislation is expected to be extended.

Several distinct types of third party contracting are available to the military, each with different restrictions and key factors for successful execution. One component essential for project success is an accurate description of the facility's requirements in the Request for Proposal (RFP) issued by the Government. Another critical component is a construction cost below that of a comparable facility constructed under traditional MCA practices. Since lease or service contracts may last as long as 20 to 32 years, design shortcomings or disadvantageous economies will have significant negative long-term consequences.

There is a need for standards to be made available to USACE construction agents to help develop the technical requirements appropriate for inclusion on a TPC RFP to ensure successful project execution.

1-2. Purpose

The purpose of this project is to develop and document consistent standards for personnel preparing the technical requirements included in RFPs for Third-Party Contracted Army facilities.

1-3. Approach

Existing documentation on TPC laws, regulations, and procedures was investigated. Personnel involved with the initial Army TPC projects were interviewed. Lessons learned from TPC projects were compiled. Rule-type processes were developed to associate variables in a TPC project with advice on the appropriate composition of the technical requirements. Considerations were given to factors affecting the composition of design and technical criteria included in an RFP. Matrixes were developed to assist in associating features of specific TPC projects with the appropriate design and technical guidance. Sources for obtaining design and technical criteria, and for accessing the appropriate advice applicable to TPC facilities were documented.

1-4. Scope

This information in this report addresses the Third Party Contracting of facilities where the Army will be the tenant, similar in principle to 801 "Build-to-Lease" family housing. Nonresidential facility types are addressed in this guidance. Other TPC programs involve contracting for services; a facility may be only a component of a larger service requirement. This project did not address TPC service-type contracts.

This report provides help in develop design and technical requirements for Army TPC facilities. These requirements will be contained in an RFP prepared by the USACE construction agent (or contracted Architect/Engineer [AE] services) and distributed to prospective proposers. Preparation of the RFP document and evaluation of the proposals, although closely related activities and integral to the TPC process, are outside the scope of this work.

1-5. Mode of Technology Transfer

It is recommended that the information in this report be further distributed as an Architectural and Engineering Instruction (AEI) by HQUSACE (CEMP-EA) on the Defense Criteria Information System (DCIS) for use by project managers and technical personnel involved in Army TPC projects.

1-6. References

The following legislation is referenced as background material to assist in the understanding of TPC project variables. It is not intended to be direct guidance for the development of technical requirements for an Army TPC facility.

- a. Title 10 USC 2662. Real Property Transactions
- b. Title 10 USC 2667. Leases: Non-Excess Property
- c. Title 10 USC 2809. Long-Term Facilities Contract Test
- d. Title 10 USC 2821. Housing Rental Guarantee
- e. Title 10 USC 2828. Military Family Housing Leasing
- f. Title 10 USC 481. Property Management
- g. Title 10 USC 490. Operation of Buildings
 - (1) 2809 Test of Long Term Facilities Contracts:
 - (a) Child care services
 - (b) Potable and waste water treatment services
 - (c) Depot supply activities
 - (d) Troop housing
 - (e) Transient quarters
 - (f) Hospital or medical facilities
 - (g) Other logistic and administrative services, other than depot maintenance.
 - (2) 2828 Military Housing Build-to-Lease Program (801 Housing)
 - (3) 2821 Military Housing Rental Guarantee Program (802 Housing)
 - (4) 2394 Contracts for Energy or Fuel for Military Installations
 - (5) 2667 Land Leases, Non-Excess Property.

2. DESCRIPTION OF TPC METHODS/VARIATIONS

2-1. General

a. TPC projects use PSF to provide facilities and services needed by the military. There are several advantages to TPC projects. This way, the military need not appropriate funds for facilities. This is advantageous to the Government because sufficient funding is not presently available to satisfy all new facility construction requirements. By allowing the private sector to use commercial design and construction guidance, it is possible to reduce the first cost of construction. The Government may gain a further economic advantage if economic analysis verifies that the Contractor can construct and operate the facility more economically than comparable MCA construction and Government operation. Successful use of TPC can provide many crucial facilities and services during the present downturn in military construction funding.

b. Two requirements create a successful TPC project: the construction cost of the facility must be lower than a comparable MCA facility, and additional revenue obtained by the contractor by providing supplementary services must reduce the cost to the military. For example, the contractor could provide a laundry facility or rentable storage units in addition to housing units. This amenity could add revenue while reducing housing costs to the military.

2-2. Description of TPC concepts

a. There are three distinct types of TPC, or PSF projects. The first type, Outleasing, uses enabling legislation *Title 10 USC 2667*, and *Title 10 USC 2662*. The second type, Long-Term Facilities Contracts, uses enabling legislation *Title 10 USC 2809*. The third type, Build/Lease of Military Family Housing, uses enabling legislation *Title 10 USC 2828*. Outleasing and Long-Term Facilities Contracts will be discussed in detail in the following section. Build/Lease of Military Family Housing, commonly known as 801 Housing, can be used as a successful example of TPC, and is described below.

b. Each type of Third Party Contracting has variations, such as location (on-post or off-post), and land ownership (government or private). The contract governing TPC agreements must regulate many critical areas, and will determine the type of facility constructed, services provided, maintenance responsibility, duration of the contract, payments and escalation rates, and the final disposition of the facility. Each contract must be composed to safeguard the Government's interests while providing suitable opportunity for the prospective Third Party Contractor.

c. The facility technical requirements, contained in the RFP, describe the desired facility features and characteristics. The facility must adequately house the services being contracted for at a reasonable cost. Generally, the first cost of the facility must be lower than the governments' estimated cost or the prospective Third Party Contractor cannot justify the project. The facility is described through the functional requirements of the Army tenant. The Contractor is responsible for design development and execution. Chapter 3 discusses conditions that suggest when it would be advisable for the Government to further regulate the design of selected facility features.

2-3. Outleasing—2667

a. Outleasing occurs when the government leases land to a state or private enterprise. It is sometimes called outgranting and is authorized under *Title 10 USC 2667. Leases: Non-Excess Property*. Outleases are often used for third party contracting or private sector financing projects where a contractor builds on government land. Outleases may be used solely for leasing land, without any requirements for facility construction. Before an outlease is used, *Title 10 USC 2662. Real Property Transactions: Reports to the Armed Services Committees* requires notification of the appropriate Congressional committees. The lease under this law must allow the government to revoke the lease at any time (unless this clause is omitted). Ownership of the land is retained by the government during the term of the lease. If the lease is revoked by the Service Secretary to allow sale of the property, the lessee has the first right to purchase the property.

b. Property considered for outlease must be under military control, not needed for public use, and not considered excess property. Terms in the lease often require construction of facilities by the lessee. This use of outleasing for private sector financing projects allows the lessee to construct a facility and/or perform a service using private sector funds. The government incurs only the cost of preparing and awarding the lease. Private businesses are compensated for their investment by service charges paid by the military for the use of the facility and/or services. By law, the military is not allowed to provide any guarantees to a private business with Federally appropriated funds. Therefore, it is in the best interests of the prospective Third Party Contractor to conduct a thorough risk assessment and market analysis before investing a large sum of money in such a project. The financial institution loaning money for the project will want to be assured the minimum cash flow will satisfy the payment of debt. One option to encourage investment by private business and satisfy financial institutions is for the government to guarantee the minimum payment of debt on a project with nonappropriated funds.

c. Title to the facilities usually remains with the lessee for the lease period when the terms of the lease require a facility be built on government land. The terms of the lease should indicate how the facilities constructed on Government land should be disposed. A number of options exist: renewal of the lease, sale of the facilities to the government, removal of the facilities and restoration of the land by the lessee, abandonment by the lessee in lieu of removal, or title passage to the government. A court decision has established that if the lessee elects not to remove the improvements, title to the improvements passes to the government (Meade Heights, Inc. v. State Tax Commission, 1953 95 A.2d280, 202 Md.20).

d. Rental Rate. Most TPC outlease projects require the lessee to pay a nominal rent for the duration of the lease. Several projects that required the lessee to build a facility on government land called for a rent of one dollar for the entire term of the lease. Money received for such leases is paid directly to the military and entered into the Treasury as miscellaneous receipts. Another way for the government to charge a Third Party Contractor for leasing land is to tax the operation in a manner similar to a city tax. This has been done at Fort Drum where a "contract administration fee" of one dollar is charged for each lodging room occupied for 1 night.

e. Utilities or Services Purchased From the Government. Under many leases, the lessee is provided with an option to purchase utilities or services directly from the government. These services or utilities, if offered at a cheaper rate, or from a closer location could help reduce the contractor's costs.

f. Terms of the Lease. An outlease may be established for any length of time. The term of the lease typically coincides with the economic life of the facility or duration of long-term facilities contract.

g. Construction Standards. The government has the right to establish minimum construction standards when an outlease requires the construction of a facility. It is desirable to use nationally

recognized construction standards and building codes instead of Government or USACE criteria and specifications to allow the contractor opportunity to innovate. Also, contractors are often able to construct a lower cost facility using commercial codes and standards rather than military construction standards.

h. Maintenance Responsibility. The maintenance responsibility generally rests with the Contractor. The government cannot use appropriated funds to pay for maintenance. Local deviations may be arranged to suit circumstances, such as when the contractor reimburses the Government for maintenance activities performed by the Government.

i. Enforcement of Standards. The lease should establish standards of construction, operation and maintenance of facilities or services. Inadequate performance can be considered a breach of the lease and possibly result in lease termination. Termination procedures to be followed by the government in the event of a breach of the lease by the lessee should also be established. Proposals will be evaluated and the winning proposal selected based on the prospective Third Party Contractor's standards of facility design and construction, project economics and proposed services.

j. Applicability of State, County and City Taxes. The Federal government cannot be directly taxed by a state. However, a Contractor may be liable for taxes in a Private Sector Financing venture. Many federal laws give the states and their taxing authorities the ability to collect income taxes from a Contractor conducting business on government lands. Concession sales may be taxed in the form of a sales tax levied by the state. State and local governments may also annex military land and collect taxes on private ventures operating on outleased lands. Tax liability can raise the Contractor's operating costs and must be included in the economic analysis.

(1) According to Title 10 USC 2667, "The interest for a lessee of property leased under this section may be taxed by State or local governments. A lease under this section shall provide that, if and to the extent that the leased property is later made taxable by State or local governments under an Act of Congress, the lease shall be renegotiated."

(2) Another law, Title 4 USC 105, State, and So Forth, Taxation Affecting Federal Area; Sales or Use Tax, directly addresses taxing private ventures on federal lands. "No person shall be relieved from liability for payment of, collection of, accounting for any sales or use tax levied by any State, or by any duly constituted taxing authority therein, having jurisdiction to levy such a tax, on the ground that the sale or use, with respect to which such tax is levied, occurred in whole or in part within a Federal area; and such State or taxing authority shall have full jurisdiction to levy and collect any such tax in any Federal area within such State to the same extent and with the same effect as though such area was not a Federal area." This title, enacted by Congress, allows the states sufficient sovereignty over Federal lands to levy and collect taxes.

k. Minimum Requirements. Four requirements must be established before a TPC project may be undertaken:

- (1) A validated need for the project that is fully justified by the organizational mission.
- (2) An economic analysis that concludes TPC is the best option.
- (3) Congressional support (including an environmental impact study and local support). It is important to determine the economic impact on the community so the project is not perceived as unfair competition by the local business community.

(4) Private sector interest. Third Party Contractors must be allowed an acceptable return on their investment.

1. Who Must Approve. Title 10 USC 2667 authorizes the Service Secretary to approve outleases. Title 10 USC 2662. Real Property Transactions: Reports to the Armed Services Committees. requires Congressional notification on all leases where "the expected annual fair market rental value of the property is more than \$100,000." The Department of Defense requires all military services to notify Congress 30 days before awarding an outlease for a PSF project. Four Congressional Committees must be notified at this time due to the potential criticism of on-base entrepreneurs competing with off-base entrepreneurs.

2-4. Long-Term Facilities Contracts—2809

a. Long-term facilities contracts allow the military to contract for the construction, management, and operation of a facility on or near an installation for a period of up to 32 years. Long-term facilities contracts are similar to outleases, except that long-term facilities contracts provide the Contractor a federally guaranteed cash flow—an important difference.

b. The Contractor finances, designs, constructs, and operates the facility in a manner similar to an outlease. Unlike a straight outlease, a long-term contract guarantees financing backed by appropriated federal funds. The government contracts for a service for 20 to 32 years, using a long-term facility contract. (The maximum contract period was changed from 20 years to 32 years to coincide with the new depreciation schedule for federal income tax.) The Contractor will then build and equip the facility to provide the desired service. Each month a payment is made to the contractor for services performed. The government's monthly payment is used by the contractor to service the debt, cover operating expenses and taxes, and make a profit.

c. Discussion of Laws That Regulate Outleasing. Long-term facilities contracts are authorized under Title 10 USC 2809. Test of Long-Term Facilities Contracts. If the project is built on government owned land, an outlease is required according to Title 10 USC 2667. Leases of Non-Excess Property. When property is Outleased, appropriate Congressional committees must be notified, according to Title 10 USC 2662. Real Property Transactions: Reports to the Armed Services Committees.

(1) Title 10 USC 2809 states that the Secretary of a military service: "may enter into contract for the construction, management, and operation of a facility on or near a military installation for the provision of an activity or service in the following categories:

- (a) Child care services,
- (b) Potable and waste water treatment services,
- (c) Depot supply activities,
- (d) Troop housing,
- (e) Transient housing,
- (f) Hospital or medical facilities,
- (g) Other logistic and administrative services, other than depot maintenance."

(2) For each facility requested as a long-term facilities contract, the Service Secretary must submit a justification of the need and a lifecycle economic analysis of all options to Congress. Congress then has 21 days to review the submittal before contract award.

d. How the Law Works.

(1) Long-term facilities contracts allow the military to contract for a needed service that is available in the private sector. Long-term facility contracting is a comprehensive approach that includes land acquisition, facility design, construction management, facility maintenance, and service contracting, into one contract.

(2) The private sector can sometimes provide a service more efficiently than the government can. This type of contract is for a total service, not just a building. The cost of the facility is amortized over the duration of the contract with each bill collected for services. As a result, the military can spread facility payments throughout the duration of the contract instead of incurring a large capital cost at the time of construction. If the contractor is allowed to use commercial construction standards instead of military construction standards, the government may benefit through reduced construction costs. It is in the interest of the prospective Contractor to propose a facility without any extraneous embellishments to win a competitive contract. A cost efficient facility will lower the contractor's investment costs, and therefore reduce the service fees charged to the government throughout the contract duration. Experience in third party contracting has shown that, to win a long-term facilities contract, the Contractor's first cost of the facility must be lower than the government construction estimate.

e. Ownership and Right to Title. The long-term facilities contract lease determines ownership of the land and facilities. Unique circumstances will dictate different contractual arrangements for each project. The project conditions discussed in Chapter 3 will influence ownership at the end of the contract. These conditions include:

- (1) Whether the project is located on government land or private land
- (2) The duration of the lease
- (3) The type of services and facilities being contracted, and
- (4) Planned disposition of the facility at the end of the contract.

f. Ownership and Right to Title—ON-POST. Many long-term facilities contracts involve construction on government land. These projects require an outlease of the government land for the duration of the lease. The Contractor's financiers typically require the outlease to extend for the duration of the mortgage. By law, the outlease must allow the government to revoke the lease at any time, unless the Service Secretary decides that omission of the revocation clause is in the best interest of the government. The Contractor will have first right to purchase the land should the government decide to sell the property.

(1) The right to title of the facility improvements lies with the Contractor during the term of the contract/lease, even when the facility is built on government property. Four options exist for the disposition of the facility at the end of the contract/lease: 1) renew the contract/lease, 2) purchase the facility and improvements from the contractor, 3) require the demolition of the facility by the contractor, or 4) allow the title to pass to the government in lieu of removal of the facility. If the contractor sells the facility to another private party, the government must first approve the sale.

(2) Long-term facilities contracts may extend for up to 32 years, allowing adequate time for the Contractor to amortize capital investments in facilities and equipment. Contractors generally will structure their economic analyses to allow retirement of the facility mortgage within the contract period.

(3) Contract clauses that allow the government to acquire title of the facility at the end of the lease/contract can be considered "lease-purchase." Title 10 USC 2809 does not authorize the government to acquire title to facilities through long-term facilities contracts. Attempts to acquire facilities using long-

term facilities contracts create two problems. First, using lease-purchase to obtain facilities appears to be an effort to bypass the conventional Military Construction authorization process. Also, the Contractor may be required to pay capital gains taxes within a few years into the contract, which would affect project financing and the government service fees. Second, the Office of Management and Budget requires the military to authorize the entire contract amount in the first contract years. These issues will be clarified once several long-term facilities contracts have been awarded and completed.

g. Ownership and Right to Title—OFF-POST.

(a) A different situation exists when the facility is built on private land. This situation is similar to the "801" housing built under Title 10 USC 2828 build/lease of military family housing. The current approach being used for "801" housing, and planned for long-term facilities contracts, is for the government to secure an option for purchase of the desired land. This option would be obtained before the government solicits request for proposals. The option for purchase of land is transferrable to the successful proposer and will guarantee the purchase price of the land at a known price. All proposers will be able to respond to the request for proposals using the same land price and building constraints. Also, the proposers will be assured the property location is acceptable to the government. Pending legislative changes may require the government to purchase the property before soliciting the request for proposals, and outlease the land to the Contractor for the duration of the contract.

(b) When the facility is located off-post, the contractor amortizes the capital costs for the facility and equipment over the term of the contract. Since the facility is off-post, military commanders may not be interested in acquiring the facility at the end of the contract. Buildings and equipment that may be as much as 20 to 32 years old could be obsolete or unnecessary for military use at the contract's end. If the buildings and equipment are technologically current and still needed by the military, the contract may be renegotiated for another period. The Contractor who provided service during the previous contract would be able to offer the desired services for a lower price than the competitors because the facility is already amortized.

h. Rental Rate. The cost of the land is included in the Contractor's economic analysis and resulting fee structure. If the land is on-post or owned by the government, a nominal fee of one dollar is typically charged for the term of the outlease/contract. The government will benefit through reduced service fees because the land cost will not be amortized by the contractor. Facilities built on private land will result in additional service charges to the government to cover the land purchase price. (The possible legislative changes that may require government purchase of all land prior to the solicitation of request for proposals applies here as well.)

i. Term of the Lease. An amendment to Title 10 USC 2809 allows the government to establish a long-term facilities contract for any period up to 32 years. This timeframe was established to coincide with the new federal tax laws for depreciation. Long-term facilities contracts can be renewed with a regular service contract if desired, since the facility is already in place.

j. Construction Standards. Suitable construction standards and codes must be identified for each long-term facilities contract. Any unnecessary requirements imposed on the Contractor can increase the construction cost. Therefore, in a majority of the long-term contracts, a combination of performance specifications and model or local building codes are preferred over standard military construction standards.

(1) Some contracts will dictate construction of a facility unique to the military. Since such facilities are not typically found in the commercial sector, additional guidance must be provided to the proposers. A schematic facility design or complete functional description of the desired facility may be

offered to proposers to establish minimum proposal submittal requirements. Also, in some cases, model or local building codes may be supplemented by more specific military or commercial standards for design and construction.

(2) Preparation of the facility technical requirements included in the Request for Proposal is discussed in Chapters 4 and 5.

k. Maintenance Responsibility.

(1) Title 10 USC 2809 does not specifically mention maintenance; however, the intent is for the contractor to assume responsibility for maintenance. The law states "Contract for the construction, management and operation of the facility . . ."

(2) It is generally in the best interest of the Government for the Contractor who builds the facility to also maintain it. The contract should define who is responsible for maintenance of the facility for the duration of the contract. The cost of maintenance and repair will be included in the economic analysis conducted by both the proposers and the government. Service fees charged by the contractor will include maintenance costs, unless the Government provides maintenance services. In either case, low maintenance costs are desirable, and will be directly impacted by the facility technical requirements and guidance provided in the request for proposal. A discussion of how "Responsibility for Maintenance" affects the technical requirements can be found in Chapter 3.

l. Enforcement of Standards. The long-term contract should establish standards of construction, operation, and maintenance of facilities and services. Inadequate performance can be considered a breach of the contract and may result in termination for default. The default clause, required by the Federal Acquisition Regulation (FAR) establishes termination procedures which the government should follow.

(1) Proposals are evaluated and the successful proposal is selected based on facility design and construction, project economics, proposed services and the maintenance agreement. The building codes and standards referenced in the government's RFP must be observed in the proposers design and construction proposal. The government must then ensure that these proposed construction standards are observed during construction.

(2) Quality control plans for recent TPC projects have usually designated an independent party to inspect the job. Arrangements can be made to have local government code inspectors (City, County, etc.) ensure compliance with applicable building codes. (If property taxes will be paid to the local government, compliance with local codes is desirable.) Projects built on Army Installations may preclude local code authorities from inspecting for code compliance. Without local inspectors, two options exist. First, this responsibility may be assigned to the military. Second, an independent consultant may be retained for construction management and inspection.

(3) A potential problem exists for long-term facilities contracting; funds for inspection services are not automatically authorized. To correct this problem, a Memo of Understanding should establish what types of inspection services will be needed during construction and who will pay for them. Typically the end user of the facility being constructed will pay for inspection services to ensure that the contractor's design and construction standards, and applicable building codes are met.

(4) Under the FARs default clause, a contractor could be terminated for default, and left with a facility on government property with no way of operating it to pay the mortgage. Lenders are hesitant to loan money for construction of a facility under such circumstances unless they can charge sufficient fees. The Office of the Assistant Secretary of Defense for Production and Logistics received a deviation

to the FARs default clause for long-term facilities contracts. This deviation allows the military to break the default clause into two parts. The first part covers the facility construction with a standard FARs default clause. The second part allows the government to terminate only the service portion of the contract after the facility has been accepted. This revision to the default clause assures the lender the government will continue to pay fees to cover the mortgage even if the service portion of the contract is terminated.

m. Applicability of State, County and City Taxes. State, County and local taxes will apply to the contractor's operation regardless of the facility location (on-post or off-post). Taxes (See "Outleasing" p 8), the same for outleases as for long-term facility contracts.

n. Minimum Requirements. The requirements for a long-term facilities contract are basically the same as for an outlease. They include:

(1) A validated need for the project that is fully justified by the organizational mission.

(2) An economic analysis that concludes TPC is the best option.

(3) Congressional support (including an environmental impact study and local support). It is important to determine the economic impact on the community so the project is not perceived as unfair competition by locals.

(4) Private sector interest. Contractors must be allowed an acceptable return on their investment.

o. Who Must Approve. The Service Secretary has the legal authorization to enter into both a long-term facilities contract and an outlease after notifying appropriate Congressional committees. (See "Outleasing," p 8).

2-5. Build/Lease of Military Family Housing—2828

a. Long-term leasing of military family housing has proven to be a successful way to obtain private sector financing and construction of housing units for military families. Military family housing (MFH) units are leased from the private sector with Build/Lease of MFH. The private sector designs, finances, builds, and maintains the housing units, which are then assigned to service members by the military. The service members forfeit their housing allowances, which are paid directly to the Contractor by the service. This idea has been used successfully at many overseas bases.

b. Discussion of Laws That Regulate Build/Lease of MFH. Title 10 USC 2828 Leasing of Military Family Housing authorizes build/lease of MFH (commonly referred to as "801 housing") within the Continental United States. The law was enacted in 1983 as a 2-year test and has undergone many amendments since.

(1) DOD policy is that all 801 housing should be built on private land.

(2) The law allows the Service Secretary to enter into a contract for a lease of new or rehabilitated MFH units. There must be an established demand for housing units, and each contract must be publicly advertised. The contract will be awarded by competitive bid or competitively negotiated contracting procedures for a period of up to 20 years. The contract must include a provision that the United States is obligated to make payments each fiscal year subject to the availability of appropriations.

The contract for lease of MFH may also include the lease of a child care center, civic center building, and similar facilities constructed for the support of the family housing.

c. How Build/Lease of Military Family Housing works.

(1) An 801 housing project combines features of a construction contract and a triple-net lease. First the military establishes a validated need for additional housing, establishes quantity and minimum construction standards, and obtains a purchase option for the desired land. The Request for Proposal is then sent out to identified proposers. Proposers respond to the RFP with a proposal that includes the facility design and monthly rental rate for the term of the lease. All proposers are also required to post proposal bonds to insure performance if they are awarded the lease. The military selection committee reviews all proposals and selects the best proposal on the basis of cost and quality.

(2) After selection of the successful proposal, the military submits an economic comparison to the Congressional committees. The economic analysis must show that the life cycle cost of leasing military family housing (MFH) for 20 years is at least 5 percent less than the conventional Military Construction Program approach. The Service Secretary may award the contract after Congressional approval, or after 21 days have elapsed since Congressional notification. The successful proposer is then required to post lease, construction performance, and payment bonds to ensure quality and timely performance.

d. Ownership and Right to Title.

(1) DOD policy clearly identifies the owner of the land, housing, and related facilities constructed for an 801 project. Although the military is authorized to spend up to 12 percent of the property's fair market price to secure the land option, and a portion of the rent payment amortizes the land and construction costs, the developer owns the land and all related improvements.

(2) Creative contract clauses that might allow the military to lease/purchase the facility are not permitted with an 801 housing contract. A separate purchase after the contract expires is not, however, ruled out. The law states: "A contract under this subsection shall provide that, upon the termination of the lease period, the United States shall have the right of first refusal to acquire all rights, title, and interest to the housing facilities constructed and leased under the contract."

e. Rental Rate.

(1) Experience has proven that the triple-net lease used for all new 801 housing projects can lower the Contractor's cost of financing construction. Under a triple-net lease arrangement, the military assumes maintenance responsibility for the MFH units after their formal acceptance and a 1-year warranty period. Any increases in taxes or insurance after the second year are also paid by the military. A contract is made directly between the military and the public utility for the cost of utilities used by the military residents. This contractual arrangement eliminates much of the risk of cost escalation for the Contractor and his/her lender. The mortgage amortization schedule for the land and facilities, and cost of taxes can be fixed for the contract duration. The lease arrangement is arranged to receive at least an AA (investment grade) bond rating to encourage investment.

(2) The military's payments can be divided into the following categories:

- (a) Land, facilities, and taxes/insurance (fixed in the first 2 contract years)
- (b) Maintenance expenses (unless the military provides maintenance)
- (c) Utilities expenses

- (d) Tax increases
- (e) Insurance increases.

f. Term of the Lease. Leases for military family housing may be contracted for up to 20 years, and renewed on a year-to-year basis after that.

g. Construction Standards.

(1) The Office of the Secretary of Defense has established a model RFP for 801 housing projects. The following building standards and codes are listed in the model RFP:

- (a) Federal Manufactured Housing Construction and Safety Standards (FMHCSS)
- (b) National Electric Code
- (c) Uniform Plumbing Code
- (d) Applicable Model Building Code
- (e) National Fire Protection Association (NFPA) 101 Life Safety Code.

(2) Locally adopted codes will apply if they are more restrictive than those listed above.

(3) The model 801 housing RFP establishes minimum design criteria for items such as: minimum appliances, minimum ceiling heights, minimum bedroom widths, minimum size and number of closets, etc. Both design and construction standards are described by performance specifications to allow proposers maximum flexibility when preparing a proposal. The military evaluation team will consider whether each proposer meets or exceeds the established performance specifications when ranking the proposals. The winning proposer's design and construction standards are combined with the RFP to create the contract/lease for the project.

h. Maintenance Responsibility. A Congress conference report dated 22 December 1987 requires the military to assume maintenance responsibility for 801 housing after a 1-year warranty period on the construction. The intent for this decision is to allow the military to use a triple-net lease. A triple-net lease allows the military to compete for a service contract for housing maintenance. The Contractor's risk of increased maintenance costs is reduced by separating the maintenance cost from the cost of financing construction.

i. Enforcement of Standards. The lease/contract establishes the standards of construction. Failure to comply with the standards can be considered a breach of the contract and can result in termination of the contract for default.

(1) Under a triple-net lease, the Contractor is exposed to financial risk during construction, and before formal acceptance of the facility by the military. Once the facility is accepted and the 1-year warranty period passes, the contractor is not responsible for maintenance except for latent defects. Since the Government will be responsible for all maintenance costs after this period, it is essential that the Government ensure contractor compliance with all terms of the contract/lease.

(2) Construction standards and codes used in the local jurisdiction are enforced since 801 housing must be built on privately owned land. Local code officials often require the Contractor developer to provide a quality control plan and hire an independent quality control inspector to assure code compliance. The model RFP also states that the military should have access to inspect the project at any time during construction. Because many military inspectors are unfamiliar with commercial codes, it may be advantageous to hire an independent consultant for construction management and inspection services.

j. Applicability of State, County and City Taxes. State, County, and City taxes are assessed on all 801 housing projects, similar to outleases and long-term facilities contracts. The triple-net lease protects the Contractor from tax increases "after the first 2 full years following the final acceptance of the entire project." The military agrees to pay any tax increases that occur after the specified time period.

k. Minimum Requirements. The requirements for an 801 housing project are basically the same as for an outlease or a long-term facilities contract (see above). All 801 projects require:

- (1) An option to purchase private land to build the project on
- (2) Interested prospective contractors.

l. Who Must Approve. Approval for 801 housing projects is the same as for Outleases and Long-term facilities contracts.

m. Experiences to Date.

(1) A model RFP was issued by the Office of the Assistant Secretary of Defense Installations.

(2) Long-term financing rate fluctuations can affect proposal interest rates. Fluctuating interest rates between receipt of proposals and the award of the lease should be accounted for by selecting the rate at an appropriate date.

(a) This may be caused by a delay required for award of a TPC contract or lease, or by a volatile long-term bond market.

(b) One option is for the Government to call for best and final offers after evaluating the proposals. The Contracting Officer can quote the previous day's closing yield for the most recent 10-year U.S. Treasury bond. The Government would award the Agreement to Lease within 45 days of the date best and final offers are due or the successful proposer is not bound by terms of his offer.

(c) Additionally, if the rate quoted rises 1/2 percent or more in the 45 days after the best and final offer is due, the proposer is not bound by his quote.

(d) The benefit is as follows. Proposers may quote best and final offer without fear of rising interest rates, which translates into lower costs for the government.

(e) This approach could be used for both leases and long-term facilities contracts because they both use long-term financing.

(3) The Model RFP for 801 housing requires every proposer to submit a proposal bond. The suggested amount is 10 percent of the annual rent for the first year, or one million dollars, whichever is less. The contracting officer may terminate the contract for default if the proposer fails to execute the contract documents or post other bonding requirements within the established timeframe. The model RFP describes the default with the following paragraph:

In the event the contract is terminated for default prior to delivery of a Lease Bond, the successful Proposer is liable for any cost, up to the amount of the Proposal Bond, of acquiring the work that exceeds the amount of its proposal. The proposal guarantee is available to offset the difference.

(4) Construction Performance and Payment Bond. To guarantee performance during construction, the military requires the contractor to post a Construction Performance and Payment Bond for 100 percent of the construction cost. This bond guarantees that the contractor will build the facility

as contracted, and pay all material and labor costs. The bonding agent will become responsible for completion of the project if the contract is terminated for default. This requirement was established to motivate contractors to complete projects in a timely manner.

(5) Land Options. The military is required to purchase land options for all off-base 801 housing projects. Earlier 801 projects did not do this, and often land prices escalated because speculators would buy options on land in prime housing areas. Military-owned land options reduce project cost and enable all proposers to use the same land costs in their proposals. Another benefit to military-owned land options is earlier involvement in the local community. Joint planning of school enrollment, water, sewage, and electrical requirements can help avert potential community problems.

(6) Subject to Availability of Appropriations. Many bankers for early 801 projects thought the clause "Subject to Availability of Appropriations" meant the contractor would be required to perform for the full 20-year contract, while the government could walk away after 1 year. This drove interest rates up dramatically, up to 3 percent (300 basis points) over the rates on government bonds for the same term. Since it is believed that 0.6 percent (60 basis points) over the yield on similar government bonds is an acceptable rate, more clarification of the clause was needed.

(a) Legal explanations show that the "Subject to Availability of Appropriations" clause was included to keep the TPC programs consistent with Title 2 USC 651, Bills Providing New Spending Authority. This statute mandates that all new bills providing new spending authority passed by Congress will be funded by annual appropriations.

(b) The 801 housing leasing program is funded with the service's annual appropriations for "Operation and Maintenance" (O&M). The O&M account is funded in a lump sum by Congress, and seldom indicates funding for specific programs. This gives the services considerable flexibility in allocating money for long-term leases. In fact, a deliberate act by Congress would be needed to prevent funding for long-term leases. This contract clause and funding situation is the same for 801 housing and long-term facilities contracts.

(7) The greatest area of controversy in 801 housing is that of maintenance responsibility. Early 801 test projects had so many construction quality and poor maintenance problems that the "Triple-net lease" arrangement is now used for all 801 housing projects. The triple net lease reduces the Contractor's financial risk after acceptance of the housing units. This can result in lower financing costs and ultimately lower project cost.

3. FACTORS AFFECTING DEVELOPMENT OF DESIGN AND TECHNICAL REQUIREMENTS

3-1. General Considerations

a. Technical Requirements for a TPC facility. The Government's requirements for a Third Party Contracted facility are conveyed through an RFP. The RFP contains solicitation requirements, terms of the lease arrangements and contract, and other provisions necessary to initiate the arrangements. The RFP also contains provisions for the design, engineering, and construction of the facility (i.e., the technical requirements). Unlike a traditional military construction project, however, the Government does not own the facility and, therefore, will not control all details of design, engineering, and construction. The composition of these technical requirements is dependent on project-specific conditions.

b. Objectives for Technical Requirements. It is in the best interest of both the Army and the U.S. Army Corps of Engineers that a Third Party Contract be successfully implemented, once a project is selected for this method of acquisition. To ensure success, the Government's description of technical requirements in the RFP must observe the following principles. The Third Party Contractor must be able to construct a facility that is economically competitive within the commercial construction market. In these regards, the Government must avoid placing restrictions on the Third Party Contractor that would jeopardize the Contractor's economic competitiveness; i.e., the Government must avoid "overspecifying." However, the USACE construction agent is also responsible for ensuring a facility for the Army tenant that is safe, comfortable, and conducive to its mission performance. This chapter describes general considerations that will affect the content and composition of technical requirements to be included in the RFP. Chapter 4 will assist the USACE construction agent (or contracted A/E services) to determine the appropriate content and composition consistent with project-specific conditions.

3-2. Major Project Conditions Affecting Technical Requirements

a. Project Conditions. There are no clearly defined categories of TPC projects that define the appropriate content and composition of technical requirements. Conditions within any TPC project may or may not be present, or may have different implications for each project. Experience to date with Army TPC projects indicates that the following are the critical variables:

- (1) Location of project
- (2) Maintenance responsibility
- (3) Responsibility for operation and utilities' expense
- (4) Uniqueness of the facility and function
- (5) Post-contract disposition (ownership) of the facility.

Effects on TPC technical requirements are discussed in detail below. It must be emphasized that these conditions were identified largely from the Army's experience with a limited number of TPC projects. Additional conditions may become evident as TPC experience expands.

3-3. Impacts on TPC Technical Requirements

a. General. The following factors are discussed individually for clarity. In practice, they are interrelated and must be considered in combination.

b. Location. The facility's location has a significant effect on the composition of technical requirements. Three possibilities exist: on-post, off-post on Government property, or off-post on private property. The effects are:

(1) Applicability of Codes and Design and Construction Standards: Design and construction of facilities located off-post on private property will be governed by the prevailing regulatory jurisdiction. In most cases, a model building code will be adopted, accompanied by local zoning and building ordinances. The Government should have relatively little interest in design and construction, unless there is a direct effect on the Army tenant's mission performance. Approval and enforcement of the prevailing standards is accomplished by local officials. Design and construction of facilities located on-post are not subject to local codes and ordinances, and may be governed by Army and USACE criteria. The Government would generally have greater interest in design and construction. (See "Ownership of the Facility at the End of the Contract," below.) Consistent with the objectives of the TPC approach, the Government may elect to amend standard design and construction criteria to be more in keeping with local practices. Approval and enforcement is accomplished by the USACE construction agent. Alternatively, the USACE construction agent may request the local jurisdiction to enforce prevailing standards. Design and construction of facilities located off-post but on Government property may possibly be governed by either jurisdiction. In these cases, the local jurisdiction and Army Installation must determine which design and construction criteria will apply.

(2) Architectural Compatibility: If the facility is located off-post, its appearance and architectural qualities are generally unregulated beyond restrictions that may be present in local covenants or building ordinances. The Government should generally have little input relative to appearance, unless a specific image or public presence is appropriate for a particular facility. If the facility is located on-post, its appearance will be subject to the Architectural Theme and other Installation Design Guide provisions. In some areas of an installation appearance may not be critical. In other areas, materials, building form, and architectural harmony may be strictly regulated.

(3) Ownership of the Facility at End of the Contract: The ownership of the facility at the end of the contract is partially determined by the location of the site. Facilities built off-post on private land will generally remain in the possession of the contractor, unless determined otherwise. In these cases, the facility must still be a marketable income-generating commodity to the contractor. The facility must not be so deteriorated, or of such an unusual design, that it will no longer be attractive to future prospective tenants.

Alternatively, the contractor may elect to sell or demolish the facility. In either case, the Government will have relatively little interest in design and construction unless it impacts the Army tenant's mission performance. Ownership of facilities built on-post may remain with the contractor, or may revert to the Government, depending on the provisions of the contract. If ownership reverts to the Government, the Government would have a greater interest in the facility's longevity, serviceability, and operating expenses as a future resource. In either case, the Government should generally maintain greater influence over the facility's design and construction. An exception may be where the facility would be located at the perimeter of the installation. The Installation boundaries may be redrawn after the contract period has expired, and the property transferred to the private sector.

(4) Special Environmental Conditions: Special environmental conditions (such as extraordinary noise conditions) may be present on either off-post or on-post sites. The Government should maintain input into the control or mitigation of such conditions for the Army tenant in all cases.

(5) Availability of Infrastructure Support: If the facility is located off-post, requirements for site utilities and other infrastructure items should be consistent with the design and engineering of the sources supplying the facility. The contractor must ensure that the necessary utilities, road network, and other infrastructure systems are available at his/her selected site and have the required capacity for the intended purpose. If the local jurisdiction will require upgrades to these systems, their design should be

governed by the prevailing standards and practices. If the facility is located on-post, these requirements must be consistent with the design and engineering of the Installation's infrastructure systems. If the facility is located on-post the Army may assume a policy of energy conservation, regardless of utilities' payments or future ownership of the facility. In this case, the technical requirements of the RFP should address considerations for building fuel sources, energy budgets, domestic or potable water usage, and other energy or resource related considerations.

c. Maintenance Responsibility: The responsibility for maintaining the facility throughout the contract will be determined by the Government and delineated in the RFP and contract documents. The content and composition of building systems and material selection and quality requirements will depend on whether the Government or the Third Party Contractor is responsible.

(1) Maintenance by Contractor: If the contractor is to be directly responsible for the funding and conduct of all repair and maintenance activities, the Government will have relatively little interest in the selection and quality of building systems and materials. The contractor's obligations for maintaining the facility in a condition suitable for the Army tenant's occupancy should be detailed in the RFP and contract documents. Therefore, the contractor alone must determine the appropriate tradeoffs among initial construction cost and life-cycle maintenance requirements. Maintenance is ensured through contract enforcement.

(2) Maintenance by Government: If the Government is to be directly responsible for the funding and conduct of all repair and maintenance activities, the Government will have a significant interest in the selection and quality of building systems and materials. Material quality, durability, and maintenance frequency, skill levels, material availability, and required resources should be addressed in the technical requirements of the RFP.

(3) Anticipated Facility Life: The anticipated service life of the facility will affect the composition and content of technical requirements. The condition of the facility at the conclusion of the contract is of significant interest to its future, whether to the Government or to the Third Party Contractor. If the contractor is to own the facility, its disposition is of little consequence to the Government. The Government, therefore, should have little interest in the facility's condition; durability and longevity. If the Government will assume ownership of the facility, the Government should address material quality, durability, and maintainability through the technical requirements of the RFP.

d. Operating/Energy Payment Responsibility: The responsibility for paying operating and energy expenses throughout the contract will be determined by the Government and delineated in the RFP and contract documents. The content and composition of mechanical and thermal envelopment requirements will depend on whether the Government or the contractor is responsible.

(1) Payment by Contractor: If the contractor must make energy and utility payments out of a flat rental fee, the Government should have relatively less interest in operating and energy expenses. The contractor's obligations for maintaining the facility in a condition suitable for the Army tenant's occupancy should be detailed in the RFP and contract documents. Design temperatures, humidity control, air movement, and other occupant comfort criteria should be specified in the technical requirements. Therefore, the contractor alone must determine the appropriate tradeoffs among initial construction cost and life-cycle operating and energy requirements. Performance is ensured through contract enforcement.

(2) Payment by Government: The Government may pay energy and utility expenses directly to the utility supplier, or through the contractor on an actual cost reimbursement basis. The Government will then have a significant interest in the selection and quality of the building's exterior envelope and mechanical systems. Design temperatures, humidity control, air movement, and other occupant comfort criteria, as well as fuel sources, energy budgets, and other energy performance-related considerations should be addressed in the technical requirements of the RFP.

(3) Exception: The Army may assume a policy of energy conservation regardless of who pays energy and utility expenses, especially if the facility is located on-post. In this case, energy use considerations should be addressed in the technical requirements of the RFP, as discussed above.

e. Uniqueness of Function: The facility type may be common to the private commercial construction market or unique to the Army without a private counterpart. The type of facility, its use, overall composition, and degree of expertise and experience in the private construction community must be considered. The content and composition of the technical requirements in the RFP must reflect the understanding of facility requirements present in the commercial market.

(1) Facility Common to the Private Market: If the facility type is common, the Government will be assured that there is sufficient expertise available in the private market to provide a facility responsive to the Army tenant's requirements. Design and construction requirements will generally be straightforward and there will be less criticality in their description in the RFP. Functional requirements for the facility's design must be complete and accurate, although description of specific configurations is unnecessary. Observance of commonly accepted commercial engineering and construction standards will generally be appropriate for the Army tenant, and will enhance marketability after the conclusion of the contract.

(2) Facilities Unique to the Army: If the facility is not by common within the commercial construction market, or is so specialized to a particular Army mission, that there is no commercial counterpart, there may be limited expertise and experience in the private market. In this case, where a facility is "Army-unique," the Government must be explicit in the description of design and construction requirements. Such requirements may involve, but not be limited to the following:

- (a) Communications; communications security
- (b) Physical security
- (c) Redundancy of services, such as back-up power
- (d) Training using equipment unique to the Army
- (e) Repair of equipment or material unique to the Army
- (f) Handling of hazardous material unique to the Army
- (g) Medical procedures atypical of private medical practices
- (h) Functions, activities, schedules, organizational structures or patterns atypical of private commercial counterparts
- (i) Others.

In addition to a complete and accurate description of functional requirements, detailed configurations, arrangements, and criteria are appropriate for inclusion in the RFP. DOD or Army regulations or Army or USACE engineering and construction criteria may be necessary to ensure the Army tenant's mission performance. However, the USACE construction agent should rely on commercial standards for those features of the facility that are not Army-unique.

(3) Combinations: There may be facilities that include features common to commercial construction, as well as complex or unique requirements. In these cases, address each feature as discussed above. Technical requirements may be detailed and explicit for selected features while referencing common commercial practice for the overall facility.

f. Post-Contract Disposition of the Facility: The Government will determine the disposition of the facility at the conclusion of the contract. These provisions should be described in the RFP. The facility may be disposed of in one of four ways: 1) the contractor will maintain ownership, 2) the Government will assume ownership, 3) either the contractor or Government may assume ownership (undetermined at the time of the contract), or 4) the facility will be demolished. The facility's disposition will have a significant effect on the content and composition of the technical requirements, as the facility's longevity and service life are determined largely by its design and construction.

(1) Contractor Maintains Ownership: If the Contractor is to maintain ownership of the facility, it is the Contractor's responsibility to determine the appropriate tradeoffs among initial construction costs, operating, maintenance, and other life-cycle costs, and future income potential. The contractor's economic objectives will dictate the appropriate requirements for building systems and material quality, durability, and long-term performance. The Government will have relatively little interest in the facility's design and construction unless it impacts the Army tenant's mission performance. The contractor may recover his/her investment during the contract. In this case he/she may find no further advantage to the facility and may liquidate the asset. Alternatively, the contractor may rely on the facility as a source of income after the conclusion of the contract with the Army. In this case the Army's design and construction requirements must not be such that they leave the contractor with an unusual or otherwise unmarketable commodity, or be economically uncompetitive in the commercial marketplace.

(2) Government Assumes Ownership: If the Government is to assume ownership, the Government's interest in the facility's design and construction is significant. In addition to satisfying the Army tenant's requirements, the USACE construction agent must also ensure that the facility becomes an asset to the Army rather than a liability. The Government's economic objectives should favor life-cycle economies. The technical requirements in the RFP should address requirements for design and composition, building system and material quality, durability, operating economy, long-term performance, and work the Government can perform when the facility is transferred from the contractor. However, attention to life-cycle economies must not jeopardize a competitive initial construction cost; doing so jeopardizes successful Private Financing competitiveness. Reliance on private commercial construction standards and practices to the maximum extent possible is strongly advised.

(3) Ownership Undetermined at the Time of Contract: If it is undetermined at the time of the contract which party will assume ownership, a judgement must be made regarding the commercial potential of the facility upon contract completion. Location will be the primary consideration. If the facility is located on-post, it is likely that the Government will be inclined to promote an option for ownership. In this case, the Government assumes a significant interest in the facility's design and construction, as discussed above. If the facility is located off-post, it assumes a greater commercial potential for the contractor, and he/she may be inclined to promote an option for continued ownership. In this case, the contractor will be interested in preserving an asset beyond the duration of the contract. The Government should therefore have relatively little interest in the facility's design and construction unless it impacts the Army tenant's mission performance. Alternatively, if the facility may continue to be an asset to the Army even if off-post, the Government may promote an option for ownership. Interest relative to design and construction is discussed above.

(4) Facility To Be Demolished: If it is concluded that the facility will have no further use after the contract with the Army, its design and construction need ensure a service life only as long as the contract duration. The Government should have relatively little interest in the facility's design and construction beyond ensuring the Army tenant's mission performance throughout the contract's duration. Technical requirements in the RFP need not be any more rigorous than necessary to ensure safety and functionality for the Army tenant.

4. CONTENTS OF TECHNICAL REQUIREMENTS FOR THIRD PARTY CONTRACT REQUESTS FOR PROPOSALS

4-1. General

a. Technical Requirements and Criteria Sources. In a Third Party Contract, design, engineering, materials, and construction may be governed through prevailing building codes and standards, private commercial industry standards, private commercial industry specifications, or USACE engineering guidance. Consistent with the objectives, it is recommended that technical requirements be based on non-USACE criteria sources to the extent possible. Requirements and criteria may be invoked in a Third Party RFP by deferring to a higher authority (i.e., by the standards enforced by the jurisdiction regulating the project), by explicit or implicit reference to other criteria sources, or by explicit descriptions or specifications in the body of the RFP document.

b. Purpose. This chapter discusses the content of technical requirements for inclusion in a Third Party Contract RFP. Guidance is provided for determining the appropriate type and content of technical requirements where conditions suggest the Government should govern or control the composition of the specific building system. Each condition described in Chapter 3 is discussed individually. However, project personnel preparing a Third Party RFP must consider these conditions in combination and determine the appropriate specification content accordingly. Chapter 5 describes non-USACE criteria sources for architectural design, design engineering, or construction of building systems, and their potential application to a Third Party Contract RFP. Appendix A includes a source document for these criteria.

4-2. Architectural

a. General.

(1) There will generally be no published sources to govern the programmatic and compositional features of the facility. An architectural program should be developed using the guidance contained in Chapter 5 and Appendix B. Providing a complete and accurate design and functional requirements program should address the Government's objectives for the facility's design. Schematic or diagrammatic material may be useful in further describing programmatic or functional requirements. Architectural drawings should not be provided in the RFP unless critical to the facility's function and mission responsiveness. See sec. 4-2.e, below.

(2) Army Standard Designs or HQUSACE Design Guide-series documents may be consulted if they exist for the subject facility. However, the programmatic or architectural guidance provided in these documents should be directly applied to the Third Party RFP only where consistent with both the functional requirements of the Army tenant and the objectives of the Third Party Contracting approach.

(3) Fire and life safety criteria for fire areas and separation, egress, construction of assemblies, and the arrangement and performance of doors, windows, and openings should be governed by the prevailing building code and/or life safety standards to the extent possible. Additional criteria promulgated by the Installation Fire Marshall may be applicable.

(4) Life safety criteria for glazed assemblies should be governed by the prevailing building code, federal regulatory, and/or industry safety standards to the extent possible.

(5) Handicapped accessibility, where required, should be governed by the prevailing national accessibility standards to the extent possible.

b. If LOCATION Is ON-POST.

(1) The Government should maintain a high degree of interest in the architectural characteristics of the facility if located on an Army Installation. Composition and configuration, functionality, and appearance will be primary considerations.

(2) Observing the Installation Design Guide and Technical Manual (TM) 5-803-5, Installation Design, should address the Government's objectives for the architectural characteristics of the facility. The overall building form, arrangement of exterior features, and selection of exterior components and materials must be consistent with these requirements. The RFP may include further detailed guidance if the facility is located in a historic district or an area where specific requirements for architectural similarity may be present. The RFP should not depict a definitive design.

c. If Direct Payment for MAINTENANCE/REPAIR/RENOVATION Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain a high degree of interest in the composition of the facility if the Government will be responsible for maintaining the facility during the Third Party Contract. Maintaining the functionality and mission responsiveness of the facility throughout the contract's duration are the primary considerations.

(2) The Government should address this requirement through the design program development. Special attention should be given the discussion of Life-Cycle Considerations described in Appendix A. The design program should address requirements for versatility of space configuration, potential for space reconfiguration, remodeling and renovation potential, and upgrades to supporting utility systems.

d. If Direct Payment for OPERATING/ENERGY/UTILITIES Is the GOVERNMENT'S Responsibility. The Government should maintain a high degree of interest in the energy and operating expense of the facility. Even if not paying directly for operating costs, the Government may invoke a policy of responsible resource use. Siting, building orientation, building shape, and the composition of the exterior closure will have a significant impact on the facility's energy and operating expense. Observing the appropriate energy use standards should address the Government's objectives for controlling operating and energy expenses. Energy-related performance standards are published by model building code organizations and industry associations, as well as by USACE. Installations may also establish their own energy use guidance. The Government must determine which standards are appropriate for the specific project. Reference sec. 4-5, 4-6, and 4-11, below.

e. If the FACILITY'S FUNCTION Is ARMY UNIQUE.

(1) The Government should maintain a high degree of interest in the composition of the facility where the facility, or features within the facility, are unique or have no counterpart in the commercial design and construction market, or where there is little or no similar expertise in the general commercial market.

(2) The RFP must describe the programmatic requirements of the facility. See 4-2.a., above. In addition to written or tabular information, it may be necessary to provide schematic level architectural drawings (plans, sections, exterior or interior elevations) where such configurations and dimensions are critical to the Army tenant's function and mission performance, and where they cannot accurately be communicated by other means. Additional descriptive information (such as finish schedules, door and window schedules, fixture schedules, equipment schedules, etc.) may also be included in the RFP where necessary.

f. If the POST-CONTRACT DISPOSITION of the Facility Falls to the GOVERNMENT.

(1) The Government should maintain a high degree of interest in the composition of the facility if the Government will assume its ownership at the conclusion of the Third Party Contract. The functionality and mission responsiveness of the facility as a future resource to the Army are the primary considerations.

(2) The Government should address this requirement through the design program development. Considerations are similar to those discussed under sec. 4-2.c., above.

4-3. Substructure

a. General.

(1) Provide the following data in the RFP as it would be included in an AE package or conventional construction documents.

(a) Geotechnical data, boring locations

(b) Subsurface data (utilities, demolished/abandoned structures, spoil, other features)

(c) Topographical plan

(d) Any prevailing or special conditions present at the site or installation that would affect foundation design.

(2) Structural loading conditions should be governed by the prevailing building code to the extent possible.

(3) Seismic design may be governed by the prevailing building code or seismic design code and recognized engineering practice.

(4) Foundation design, construction, and materials should be governed by commercial industry standards and recognized engineering practice to the extent possible. Appendix A displays sources of standards and criteria; reference Overall Facility Design, Substructure, and Structural Frame criteria sources.

(5) The RFP must describe any special conditions or requirements that will be present for the project that are not addressed by the prevailing codes or commercial design, construction, and material standards.

b. If LOCATION Is ON-POST.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's structural systems if the facility is located on an Army Installation. Structural integrity, especially long-term performance, will be the primary consideration.

(2) Prevailing building codes, commercial industry standards for design, engineering, construction, and materials, and recognized engineering practices should be sufficient to preserve the Government's interests in serviceability and long-term performance. No additional provisions should be necessary unless special conditions or requirements are present.

(3) Any special conditions or requirements that will be present for the project but are not addressed by these criteria sources must be included in the RFP.

c. If Direct Payment for MAINTENANCE/REPAIR/RENOVATION is the GOVERNMENT'S responsibility.

(1) The Government should maintain a high degree of interest in the facility's maintainability. Prevailing building codes and design, construction, and material standards should be sufficient to preserve the Government's interests in maintenance and repair economy. No additional provisions should be necessary unless special conditions or requirements are present.

(2) Consider accessibility to under-slab utilities, and distribution and accessibility for electrical cabling, and other services that might be located in the first floor slab and modified throughout the life of the facility. Describe the appropriate requirements in the RFP.

(3) Consider any known or foreseeable requirements (and describe the appropriate requirements in the RFP) for changes in structural loading conditions throughout the facility's life, including, but not limited to the following:

- (a) Change in occupancy type or classification
- (b) Additions or major renovations to the building or utility systems
- (c) Addition of major ground- or frame-supported equipment
- (d) Other.

d. If Direct Payment for OPERATING/ENERGY/UTILITIES Is the GOVERNMENT'S Responsibility. The substructure's impact on the facility's energy and operating expense should be relatively minor. The appropriate energy use standards should be sufficient to preserve the Government's interests in operating economy. Requirements for foundation insulation should be consistent with the overall facility energy budget and/or thermal envelope requirements. Reference sec. 4-6 and 4-11, below.

e. If the FACILITY'S FUNCTION Is ARMY UNIQUE.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's structural systems and the accommodation of functions and activities uncommon to private commercial design and construction practice.

(2) The RFP must describe any special conditions or requirements that will be present for the project but are not addressed by the prevailing codes or commercial design, construction, and material standards. These may include, but are not limited to:

- (a) Dead loads of unique building elements
- (b) Live loads of special equipment and/or occupant activities
- (c) Dynamic loads of special equipment and/or occupant activities
- (d) Seismic protection for special equipment
- (e) Functions or activities that may affect thermal or moisture properties of the soil within the 5-foot line of the building footprint.
- (f) Requirements for facility hardening; blast or shock potential and magnitudes
- (g) Security; protection against intrusion or sabotage.

f. If the POST-CONTRACT DISPOSITION of the Facility Falls to the GOVERNMENT. The Government should maintain a high degree of interest in the facility's condition at the conclusion of the Third Party Contract. Prevailing building codes and design, construction, and material standards and recognized industry practice should be sufficient to preserve the Government's interests in assuming a serviceable facility. See sec. 4-3.c., above. No additional provisions should be necessary unless special conditions or requirements are present.

4-4. Structural Frame

a. General.

(1) Structural loading conditions should be governed by the prevailing building code and/or structural loads standards to the extent possible.

(2) Fire safety criteria for structural assemblies should be governed by building code and/or life safety standards to the extent possible.

(3) Seismic design should be governed by the prevailing building code or seismic design code and recognized engineering practice to the extent possible.

(4) The RFP must describe occupancy characteristics that will affect the design of the Structural System and its components (Appendix B). Characteristics specific to the Structural System must be included, such as occupancy type/classification, occupant populations, equipment, furnishings, and other occupant live-loads. Describe any constraints on deflections, vibrations, and other responses to loads that will affect the Army tenant's mission, functions, or equipment operation.

(5) Structural design, construction, and materials should be governed by commercial industry standards and recognized engineering practice to the extent possible. Appendix A displays sources of standards and criteria; reference Overall Facility Design, Substructure, and Structural Frame criteria sources.

(6) The RFP must describe any special conditions or requirements that will be present for the project that are not addressed by the prevailing codes or commercial design, construction, and material standards.

b. If LOCATION Is ON-POST.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's structural systems if the facility is located on an Army Installation. Structural integrity and fire and life safety will be the primary considerations.

c. Prevailing building codes, commercial industry standards for loading criteria, fire and life safety, design, engineering, construction, and materials, and recognized engineering practices should be sufficient to preserve the Government's interest in structural performance and integrity. No additional provisions should be necessary unless special conditions or requirements are present.

d. Any special conditions or requirements that will be present for the project but are not addressed by these criteria sources must be included in the RFP.

e. Additional fire and life safety criteria promulgated by the Installation Fire Marshall may be applicable.

f. If Direct Payment for MAINTENANCE/REPAIR/RENOVATION Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain a high degree of interest in the facility's maintainability. Prevailing building codes and design, construction, and material standards and recognized engineering practices should be sufficient to preserve the Government's interests in maintenance and repair economy. No additional provisions should be necessary unless special conditions or requirements are present.

(2) Consider accessibility to utilities and distribution and accessibility for electrical, cabling, and other services that might be located in interstitial spaces and modified throughout the life of the facility. Describe the appropriate requirements in the RFP.

(3) Consider any known or anticipated requirements and describe the appropriate requirements in the RFP for changes in structural loading conditions throughout the facility's life, including, but not limited to the following:

- (a) Change in occupancy type or classification
- (b) Additions or major renovations to the building or utility systems.
- (c) Addition of major floor- or frame-supported equipment
- (d) Other.

g. If Direct Payment for OPERATING/ENERGY/UTILITIES Is the GOVERNMENT'S Responsibility. The structural frame's impact on the facility's energy and operating expense will be minor. The appropriate energy use standards should be sufficient to preserve the Government's interests in operating economy. Requirements for thermal protection of the structural frame should be consistent with the overall facility energy budget and/or thermal envelope requirements. Reference sec. 4-6 and 4-11, below.

h. If the FACILITY'S FUNCTION Is ARMY UNIQUE.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's structural systems and the accommodation of functions and activities uncommon to private commercial design and construction practice.

(2) The RFP must describe any special conditions or requirements that will be present for the project but are not addressed by the prevailing codes or commercial design, construction, and material standards and recognized engineering practices. These may include, but need not be limited to:

- (a) Dead loads of unique building elements
- (b) Live loads of special equipment and/or occupant activities
- (c) Dynamic loads of special equipment and/or occupant activities
- (d) Seismic protection for special equipment
- (e) Hazard containment, such as fire resistiveness
- (f) Requirements for facility hardening; blast or shock potential and magnitudes
- (g) Security; protection against intrusion or sabotage.

i. If the POST-CONTRACT DISPOSITION of the Facility Falls to the GOVERNMENT.

(1) The Government should maintain a high degree of interest in the facility's condition at the conclusion of the Third Party Contract. Prevailing building codes and design, construction, and material standards and recognized engineering practice should be sufficient to ensure the Government assumes a

serviceable facility. No additional provisions should be necessary unless special conditions or requirements are present.

(2) Consider access to structural components for inspection prior to the Government's assumption of the facility. Describe the appropriate requirements in the RFP.

4-5. Roof Construction

a. General.

(1) Wind loading conditions should be governed by the prevailing building code and/or structural loads standards to the extent possible.

(2) Fire safety criteria for roofing assemblies and materials should be governed by the prevailing building code and/or life safety standards to the extent possible.

(3) Life safety criteria for glazed assemblies should be governed by the prevailing building code, regulatory, and/or industry safety standards.

(4) The RFP must describe occupancy characteristics that will affect the design of the Roof System and its components (Appendix B). Characteristics specific to the Roof System must be included, such as activities involving roof-mounted equipment or foot traffic.

(5) Roofing design, construction, and materials should be governed by commercial industry standards and recognized engineering practice to the extent possible. Appendix A includes sources of standards and criteria. Reference Overall Facility Design, Structural Frame, and Roof Construction criteria sources. Consult Corps of Engineers Guide Specifications (CEGS) in the 07500- and 07600-series for guidance relative to roofing features (i.e., materials, accessories, detailing, installation practices, etc.) that may be sensitive to the USACE construction agent, Army tenant, or the Directorate of Engineering and Housing (DEH). Provide USACE-based guidance where industry guidance is absent or not appropriate for the purposes.

(6) The RFP must describe any special conditions or requirements that will be present for the project but are not addressed by the prevailing codes or commercial design, construction, and material standards. These include, but are not limited to:

(a) Local and micro-environmental conditions such as discharges from nearby facilities, leaf litter, freeze conditions, or constraints on discharge location or volume

(b) Limitations relative to other Installation activities, especially around airfields such as reflection considerations, acceptability of roofing ballast, etc.

b. If LOCATION Is ON-POST.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's roof systems if the facility is located on an Army Installation. Serviceability, durability, maintainability and possibly appearance will be primary considerations.

(2) The overall architectural characteristics of the facility should be governed by the Installation Design Guide. Roof configuration and materials must be consistent with these requirements.

(3) Prevailing building codes, commercial industry standards for loading criteria, fire and life safety, design, engineering, construction, and materials, and recognized architectural and engineering practices should be sufficient to preserve the Government's interest in the roof performance and integrity.

(4) No additional provisions should be necessary unless special conditions or requirements are present.

(5) Any special conditions or requirements that will be present for the project but are not addressed by these criteria sources must be included in the RFP (Appendix A).

(6) Criteria based on USACE guidance (such as CEGS 07500- and 07600-series) may be incorporated into the RFP where roof performance is especially sensitive to the Army tenant or Installation.

(7) Additional fire and life safety criteria promulgated by the Installation Fire Marshall may be applicable.

c. If Direct Payment for MAINTENANCE/REPAIR/RENOVATION Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain a high degree of interest in the integrity, longevity, and maintainability of the facility's roof systems. See sec 4-5, above, relative to roofing design and materials. Including a (20-year) warranty requirement for roofing systems in the RFP should be considered.

(2) Criteria based on USACE guidance (such as CEGS 07500- and 07600-series) may be appropriate where roof maintenance is especially sensitive to the Army tenant, Installation, and DEH.

(3) If maintenance work is to be performed by Government forces, consider the experience present in the various roofing types, and the availability of personnel skill levels, equipment, and materials to conduct the work. Include in the RFP any constraints on acceptable roofing system types.

(4) Describe in the RFP any limitations on inspection and other routine maintenance activities that may not be performed according to industry-recommended schedules or frequency. Describe what routine maintenance activities and frequencies can be anticipated.

(5) Describe any limitations on drainage and guttering that may be driven by local conditions such as leaf litter, rainfall patterns, wind conditions, freeze conditions, or constraints on discharge location or volume.

(6) Consider the occurrence of roof-mounted equipment maintenance and other activities throughout the facility's life. Include the appropriate requirements for foot traffic protection in the RFP.

(7) Include in the RFP any constraints on roof system types necessitating roof replacement activities. Consider activities, equipment, materials, and personnel skill levels necessary to tear down and reroof the facility. Consider down-time and disruption that will be acceptable and unacceptable to the Army tenants.

d. If Direct Payment for OPERATING/ENERGY/UTILITIES Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain a high degree of interest in the energy and operating expense of the facility. The roof system's impact on the facility's energy and operating expense will be significant. The appropriate energy use standards should be sufficient to preserve the Government's interests in operating economy. Requirements for thermal resistance of the roofing system should be

consistent with the overall facility energy budget and/or thermal envelope requirements. Energy-related performance standards are published by model code organizations and industry associations as well as by USACE. The Government must determine which standards are appropriate for the specific project. Reference "Exterior Closure" (p 32) and/or "HVAC Systems" (p 43).

(2) Requirements for insulation detailing, prevention of thermal bridging, insulation and detailing of penetrations, vapor retarding and venting, and other energy-performance related features should be addressed in the RFP, either by original text or reference to an accepted industry standard.

e. If the FACILITY'S FUNCTION Is ARMY UNIQUE.

(1) The Government should maintain a high degree of interest in the integrity and long term performance of the facility's roof systems and the accommodation of functions and activities uncommon to private commercial design and construction practice.

(2) The RFP must describe any special conditions or requirements that will be present for the project but are not addressed by the prevailing codes or commercial design, construction, and material standards and recognized engineering practices. See GENERAL discussion, above. These may include, but are not limited to:

- (a) Security; protection against intrusion or sabotage
- (b) Discharges or emissions from the facility or nearby facilities
- (c) Occurrence or foreseeable addition of roof-mounted equipment
- (d) Occurrence of foot traffic beyond normal maintenance and repair activities.

f. If the POST-CONTRACT DISPOSITION of the Facility Falls to the GOVERNMENT.

(1) The Government should maintain a high degree of interest in the facility's condition at the conclusion of the Third Party Contract. Provisions discussed under 4-5.a-e, above, should be sufficient to preserve the Government's interests in assuming a serviceable facility.

(2) Consider access to roof components and interstitial spaces for inspection prior to the Government's assumption of the facility. Describe the appropriate requirements in the RFP.

(3) Other provisions in the Third Party Contract may address a requirement for roof replacement prior to the Government assuming the facility.

4-6. Exterior Closure

a. General.

(1) Wind loading conditions should be governed by the prevailing building code and/or structural loads standards to the extent possible.

(2) Seismic design should be governed by the prevailing building code or seismic design code and recognized engineering practice to the extent possible.

(3) Fire and life safety criteria for egress, wall construction, and arrangement and performance of doors, windows, and openings should be governed by the prevailing building code and/or life safety standards to the extent possible.

(4) Life safety criteria for glazed assemblies should be governed by the prevailing building code, regulatory, and/or industry safety standards to the extent possible.

(5) Handicapped accessibility, where required, should be governed by the prevailing national accessibility standards to the extent possible.

(6) The RFP must describe occupancy characteristics that will affect the design of the exterior closure and its components (Appendix B). Characteristics specific to the Exterior Closure System must be included, such as operational requirements of doors, overhead doors, or operable windows.

(7) Exterior closure design, construction, materials, and products should be governed by accepted commercial industry standards and recognized architectural and engineering practice to the extent possible. Appendix A includes sources of standards and criteria. Reference Overall Facility Design, Structural Frame, and Exterior Closure criteria sources.

(8) The RFP must describe any special conditions or requirements that will be present for the project that are not addressed by the prevailing codes or commercial design, construction, material and product standards (Appendix B). These must include requirements specific to the exterior closure system, such as local and micro-environmental conditions and security requirements.

b. If LOCATION Is ON-POST.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's exterior closure systems if the facility is located on an Army Installation. Appearance, serviceability, and durability will be primary considerations.

(2) The overall architectural characteristics of the facility should be governed by the Installation Design Guide. The exterior configuration, components, and materials must be consistent with these requirements.

(3) Prevailing building codes, commercial industry standards for loading criteria, fire and life safety, design, engineering, construction, and materials, and recognized architectural and engineering practices should be sufficient to preserve the Government's interest in the exterior closure performance and integrity. No additional provisions should be necessary unless special conditions or requirements are present.

(4) Any special conditions or requirements that will be present for the project but are not addressed by these criteria sources must be included in the RFP.

(5) Additional fire and life safety criteria promulgated by the Installation Fire Marshall may be applicable.

c. If Direct Payment for MAINTENANCE/REPAIR/RENOVATION Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain a high degree of interest in the integrity, longevity, and maintainability of the facility's exterior closure systems. See 4-6.a., above, relative to exterior wall design and materials.

(2) Commercial industry standards for the design, engineering, construction, and materials, and recognized architectural and engineering practices should suffice for preserving the Government's interests in facility maintainability. No additional provisions should be necessary unless special conditions or requirements are present.

(3) If maintenance work is to be performed by Government forces, consider the experience present in the various exterior materials and the availability of personnel skill levels, equipment, and

materials to conduct the work. Include in the RFP any constraints that will limit acceptable exterior materials, components, and/or products.

(4) Describe in the RFP any limitations on inspection and other routine maintenance activities that may not be performed according to industry-recommended schedules or frequency. Describe what routine maintenance activities and frequencies can be anticipated.

d. If Direct Payment for OPERATING/ENERGY/UTILITIES Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain a high degree of interest in the energy and operating expense of the facility. The exterior closure systems' impact on the facility's energy and operating expense will be significant. The appropriate energy use standards should preserve the Government's interests in operating economy. Requirements for thermal resistance of the wall construction, doors, and windows system should be consistent with the overall facility energy budget and/or thermal envelope requirements. Energy-related performance standards are published by model building code organizations and industry associations, as well as by USACE. The Government must determine which standards are appropriate for the specific project. Reference sec. 4-11, below.

(2) Requirements for insulation detailing, prevention of thermal bridging, insulation and detailing of penetrations, vapor retarding, cavity venting, and other energy-performance related features should be addressed in the RFP, either by original text or reference to an accepted industry standard or practice.

e. If the FACILITY'S FUNCTION Is ARMY UNIQUE.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's exterior closure systems and the accommodation of functions and activities uncommon to private commercial design and construction practice.

(2) The RFP must describe any special conditions or requirements that will be present for the project but are not addressed by the prevailing codes or commercial design, construction, and material standards and recognized engineering practices. Address security requirements (wall construction, protection of doors, windows, glazed assemblies, mechanical openings, etc. against intrusion or sabotage, etc.).

f. If the POST-CONTRACT DISPOSITION of the Facility Falls to the GOVERNMENT. The Government should maintain a high degree of interest in the facility's condition at the conclusion of the Third Party Contract. Provisions discussed under 4-6.a-e., above, should be sufficient to preserve the Government's interests in assuming a serviceable facility.

4-7. Interior Construction

a. General.

(1) Loading conditions should be governed by the prevailing building code and/or structural loading standards to the extent possible.

(2) Seismic design should be governed by the prevailing building code or seismic design code and recognized engineering practice to the extent possible.

(3) Fire and life safety criteria for egress and partition construction should be governed by the prevailing building code and/or life safety standards to the extent possible.

(4) Life safety criteria for glazed assemblies should be governed by the prevailing building code, federal regulatory, and/or industry safety standards to the extent possible.

(5) Handicapped accessibility, where required, should be governed by the prevailing national accessibility standards to the extent possible.

(6) Occupational safety provisions should be governed by prevailing occupational safety standards and criteria to the extent possible.

(7) The RFP must describe occupancy characteristics that will affect the design and construction of interior partitions, doors, and windows. (See Appendix B.) Characteristics specific to Interior Construction systems and components must be included, such as operational requirements for moveable partitions, interior windows and doors and attachment, support of equipment, or concealment of supporting utilities.

(8) Interior construction, materials, and products should be governed by accepted commercial industry standards and recognized engineering practice to the extent possible. Appendix A includes sources of standards and criteria. Reference Overall Facility Design and Interior Finishes sources.

(9) The RFP must describe any special conditions or requirements that will be present for the project but are not addressed by the prevailing codes or commercial design, construction, material and product standards. (See Appendix B.) Include requirements for unusually severe interior environmental conditions, presence of biological, radioactive, or materials requiring special environments, and security requirements such as access control, intrusion resistance, EMP protection, or electronic signal isolation.

b. If LOCATION Is ON-POST.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's interior systems if the facility is located on an Army Installation. Performance, serviceability, and maintainability will be the primary considerations.

(2) Prevailing building codes, commercial industry standards for loading criteria, fire and life safety, design, engineering, construction, and materials, and recognized architectural and engineering practices should be sufficient to preserve the Government's interest in interior systems performance and integrity. No additional provisions should be necessary unless special conditions or requirements are present.

(3) Any special conditions or requirements that will be present for the project but are not addressed by these criteria sources must be included in the RFP.

(4) Additional fire and life safety criteria promulgated by the Installation Fire Marshall may be applicable.

c. If Direct Payment for MAINTENANCE/REPAIR/RENOVATION Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain a high degree of interest in the integrity, longevity, and maintainability of the facility's interior systems. Maintenance and reconfiguration throughout the duration of the Third Party Contract will be primary considerations. See GENERAL, above, relative to design and materials.

(2) Commercial industry standards for the design, engineering, construction, and materials, and recognized architectural and engineering practices should suffice for preserving the Government's interests in facility maintainability. No additional provisions should be necessary unless special conditions or requirements are present.

(3) Consideration must be given to modifications to space configuration and supporting utilities (primarily electrical/electronic and mechanical) throughout the facility's life. Include any requirements for partition construction that will expedite foreseeable modifications in spatial configuration. Include in the RFP any requirements for accessibility to electrical distribution, lighting, electronic cabling, and mechanical distribution that will expedite foreseeable modifications.

(4) If maintenance work is to be performed by Government forces, consider the experience present in the various exterior materials and the availability of personnel skill levels, equipment, and materials to conduct the work. Include in the RFP any constraints on acceptable interior materials, components, and/or products.

(5) The RFP must address the operational characteristics of demountable partition systems and office landscape systems, if appropriate for the subject facility. Address requirements for skill levels, personnel time, equipment, cycle times, progression, availability of parts, necessity for spare parts, and accommodation of electrical and electronic distribution.

d. If Direct Payment for OPERATING/ENERGY/UTILITIES Is the GOVERNMENT'S Responsibility. The interior systems' impact on the facility's energy and operating expense should be relatively minor. Requirements for interior construction should be consistent with the overall facility energy budget and/or thermal envelope requirements. Reference sec. 4-6 and 4-11.

e. If the FACILITY'S FUNCTION Is ARMY UNIQUE. The RFP must describe any special conditions or requirements that will be present for the project but are not addressed by the prevailing codes or commercial design, construction, material and product standards. Reference 4-7.a, above, and Appendix B for conditions that may be uncommon to typical commercial practices.

f. If the POST-CONTRACT DISPOSITION of the Facility Falls to the GOVERNMENT. The Government should maintain a high degree of interest in the facility's condition at the conclusion of the Third Party Contract. Include in the RFP the appropriate requirements relative to sec. 4-7.a-e, above.

4-8. Interior Finishes

a. General.

(1) If the Army tenant, Installation, or USACE construction agent has developed an Interior Design Guide, this may be applied to interior architecture and selection of interior finish materials if agreeable to all parties.

(2) Loading conditions for architectural assemblies and assemblies supporting other systems (such as suspended ceilings) should be governed by the prevailing building code and/or structural loading standards to the extent possible.

(3) Seismic design for architectural assemblies and assemblies supporting other systems (such as suspended ceilings) should be governed by the prevailing building code or seismic design code and recognized engineering practice to the extent possible.

(4) Fire and life safety criteria for finish materials should be governed by the prevailing building code and/or life safety standards to the extent possible.

(5) Life safety criteria for interior glazing should be governed by the prevailing building code, federal regulatory, and/or industry safety standards to the extent possible.

(6) Handicapped accessibility, where required, should be governed by the prevailing national accessibility standards to the extent possible.

(7) Occupational safety provisions for finish materials should be governed by prevailing occupational safety standards and criteria to the extent possible.

(8) The RFP must describe occupancy characteristics that will affect the selection and performance of interior finishes. (See Appendix B.) Characteristics specific to Interior Finish systems and components must be included, such as personnel activities, movements, and patterns; description of anticipated use, wear, and durability requirements; vulnerability to damage; attachment or support of equipment; or requirements for surface-mounted or concealed supporting utilities. Where appropriate, wear or duty ratings may be described for finish assemblies and materials.

(9) Interior finish materials and products should be governed by accepted commercial industry standards and recognized engineering practice to the extent possible. Appendix A displays sources of standards and criteria; reference Overall Facility Design and Interior Construction sources.

(10) The RFP must describe any special conditions or requirements that will be present for the project but are not addressed by the prevailing codes or commercial design, construction, material and product standards. (See Appendix B.) Include requirements for unusually severe interior environmental conditions, presence of biological, radioactive, or materials requiring special environments.

b. If LOCATION Is ON-POST.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's interior finishes if the facility is located on an Army Installation. Performance, serviceability, and maintainability will be the primary considerations.

(2) Prevailing building codes, commercial industry standards for loading criteria, fire and life safety, design, engineering, construction, and materials, and recognized architectural and engineering practices should be sufficient to preserve the Government's interest in interior finishes' performance and integrity. No additional provisions should be necessary unless special conditions or requirements are present.

(3) Any special conditions or requirements that will be present for the project not addressed by these criteria sources must be included in the RFP.

(4) Additional fire and life safety criteria promulgated by the Installation Fire Marshall may be applicable.

c. If Direct Payment for MAINTENANCE/REPAIR/RENOVATION Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain a high degree of interest in the integrity, longevity, and maintainability of the facility's interior finishes. See GENERAL, above, relative to design and materials.

(2) Prevailing building codes, commercial industry standards for loading criteria, fire and life safety, design, engineering, construction, and materials, and recognized architectural and engineering practices should be sufficient to preserve the Government's interest in interior finishes' maintainability. Designating the appropriate grade or rating levels for maintainability is advisable. No additional provisions should be necessary unless special conditions or requirements are present.

(3) Any special conditions or requirements that will be present for the project not addressed by these criteria sources must be included in the RFP.

(4) Interior finishes represent a relatively minor cost relative to a facility's total cost. Maintenance expenditures for interior finishes, however, have historically been significant both relative to total facility maintenance and in absolute dollar amounts. Furthermore, interior finishes can represent a recurring and highly visible source of maintenance attention, which will be disruptive to the Army tenant and disadvantageous to the Government. To avoid maintenance costs, the Government may use commercial guide specifications as the basis for RFP requirements for specialties. Including a finish schedule and specifying grades, finish quality, and other durability or quality levels appropriate for the intended use is appropriate for a Third Party Contract RFP.

(5) Consideration must be given to modifications throughout the facility's life. Include any requirements in the RFP for the selection of specialties that will expedite foreseeable interior modifications. Consider the availability and ability to match finish materials for future modifications and repairs.

(6) Consideration must be given to modifications to space configuration and supporting utilities (primarily electrical/electronic and mechanical) throughout the facility's life. Include any requirements in the RFP for finish selection that will expedite foreseeable modifications in spatial configuration. Include in the RFP any requirements for accessibility to electrical distribution, lighting, electronic cabling, and mechanical distribution that will expedite foreseeable modifications.

(7) If maintenance work is to be performed by Government forces, consider the experience present in the various exterior materials and the availability of personnel skill levels, equipment, and materials to conduct the work. Include in the RFP any constraints on acceptable interior materials, components, and/or products.

d. If Direct Payment for OPERATING/ENERGY/UTILITIES Is the GOVERNMENT'S Responsibility. The interior finishes' impact on the facility's energy and operating expense will be minor. Requirements for interior construction should be consistent with the overall facility energy budget and/or thermal envelope requirements. Reference sec. 4-6 and 4-11, below.

e. If the FACILITY'S FUNCTION Is ARMY UNIQUE. The RFP must describe any special conditions or requirements that will be present for the project but are not addressed by the prevailing codes or commercial design, construction, material and product standards. See sec. 4-8.a&b., above, for conditions that may be uncommon to typical commercial practices. Including a finish schedule specifying grades, finish quality, and other durability or quality levels is appropriate for unique requirements and for a Third Party Contract RFP.

f. If the POST-CONTRACT DISPOSITION of the Facility Falls to the GOVERNMENT. The Government should maintain a high degree of interest in the facility's condition at the conclusion of the Third Party Contract. Include in the RFP the appropriate requirements relative to sec. 4-8.a-e., above.

4-9. Specialities

a. General.

(1) Loading conditions for built-in or supported specialties (such as toilet partitions, casework, railings, etc.) should be governed by the prevailing building code and/or structural loading standards to the extent possible.

(2) Seismic design for built-in or supported specialties should be governed by the prevailing building code or seismic design code and recognized engineering practice to the extent possible.

(3) Fire and life safety criteria for finish materials should be governed by the prevailing building code and/or life safety standards to the extent possible.

(4) Life safety criteria for glazed items should be governed by the prevailing building code, federal regulatory, and/or industry safety standards to the extent possible.

(5) Handicapped accessibility, where required, should be governed by the prevailing national accessibility standards to the extent possible.

(6) Occupational safety provisions for specialties should be governed by prevailing occupational safety standards and criteria to the extent possible.

(7) The RFP should include a listing, table, or inventory of specialties that will be critical to the function and activities of the Army tenant that must be supplied by the Third Party Contractor. The RFP must also describe occupancy characteristics that will affect the selection and performance of specialties. See Appendix B for a discussion of facility design requirements.

(8) Specialties should be governed by accepted commercial industry standards and specifications to the extent possible. Appendix A displays sources of standards and criteria; reference Overall Facility Design and Specialties sources. However, there is little standards-level guidance published for most specialty items. Commercially available guide specification documents and product literature provide specification guidance.

(9) The RFP must describe any special conditions or requirements that will be present for the project but are not addressed by the prevailing codes or commercial design, construction, material and product standards, such as *unusually severe interior environmental conditions* or *unusually severe wear or use characteristics*.

b. If LOCATION Is ON-POST.

(1) The Government should maintain an interest in the performance and quality of the facility's specialties if the facility is located on an Army Installation. Performance, serviceability, and maintainability will be the primary considerations.

(2) If the Army tenant, Installation, or USACE construction agent has developed an Interior Design Guide that addresses specialty items (such as built-in casework, signage and graphics, etc), this may govern the selection of specialties, if agreeable to all parties.

(3) Providing a schedule of required specialties and specifying grades, finish quality, and other durability or quality levels in the RFP should preserve the Government's interests in specialties' serviceability and performance.

c. If Direct Payment for MAINTENANCE/REPAIR/RENOVATION Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain an interest in the longevity and maintainability of the facility's specialties. See 4-8.a, above, relative to design and materials.

(2) Specialties represent a relatively insignificant cost relative to a facility's total cost. Maintenance expenditures for specialties have historically been modest in absolute dollar amounts. However, specialties can represent a recurring and highly visible source of maintenance attention, which will be disruptive to the Army tenant and disadvantageous to the Government.

(3) To avoid maintenance cost, the Government can use commercial guide specifications as the basis for RFP requirements for specialties. Specifying grades, finish quality, and other durability or quality levels suitable for the intended use is appropriate for a Third Party Contract RFP.

(4) Consideration must be given to modifications throughout the facility's life. Include any requirements in the RFP for the selection of specialties that will expedite foreseeable movement, relocation, additions, or modifications. Consider the availability of products for addition at a later date.

(5) If maintenance work is to be performed by Government forces, consider the experience present in the various exterior materials and the availability of personnel skill levels, equipment, and materials to conduct the work. Include in the RFP any constraints on acceptable interior materials, components, and/or products.

d. If direct payment for OPERATING/ENERGY/UTILITIES Is the GOVERNMENT'S Responsibility. The Specialties' impact on the facility's energy and operating expense will be minor. Requirements for interior construction should be consistent with the overall facility energy budget and/or thermal envelope requirements. Reference sec. 4-6 and 4-11, below.

e. If the FACILITY'S FUNCTION Is ARMY UNIQUE. The RFP must describe any special conditions or requirements that will be present for the project but are not addressed by the prevailing codes or commercial design, construction, material and product standards. See Appendix B and 4-9.a., above, for conditions that may be uncommon to typical commercial practices.

f. If the POST-CONTRACT DISPOSITION of the Facility Falls to the GOVERNMENT. The Government should maintain a high degree of interest in the facility's condition at the conclusion of the Third Party Contract. Include in the RFP the appropriate requirements relative to performance, maintenance, and replacement of speciality items as discussed above.

4-10. Plumbing

a. General.

(1) Plumbing design, construction, and materials should be governed by the prevailing building code and recognized engineering practice to the extent possible. Appendix A displays sources of standards and criteria; reference Overall Facility Design, and Plumbing criteria sources.

(2) Seismic support of plumbing distribution, equipment, and fixtures should be governed by the prevailing building code or seismic design code and recognized engineering practice to the extent possible.

(3) Handicapped accessibility, where required, should be governed by the prevailing national accessibility standards.

(4) The RFP must describe occupancy characteristics that will affect the design of the Plumbing System and its components. (See Appendix B.) Characteristics specific to the Plumbing System must be included, such as the peak hot water demand due to occupant schedules, male/female ratios, fixture requirements, or demand relative to the Army tenant's activities or equipment requirements. Indicate whether the facility will be unoccupied for extended periods of time, so conservation measures may be taken. Explain circumstances where the users are atypical of commercial facility occupants. Describe any requirements for building automation systems and their integration with plumbing components and systems including: controls for water heaters, pumps and equipment; engine generator or standby power systems; and miscellaneous building systems, including booster pumps, sump pumps, etc.

(5) The RFP must describe any special conditions or requirements that will be present for the project but are not addressed by the prevailing codes or commercial design, construction, material and product standards. (See Appendix B.) These must include requirements specific to the plumbing system, such as local water supply and treatment availability, security requirements, the use of water recycling systems if special conditions require, special design and equipment requirements, the equipment supplier, and their anticipated impact on the Plumbing Systems.

b. If the Location Is On-Post.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's plumbing systems if the facility is located on an Army Installation. Serviceability, durability, and maintainability are primary considerations.

(2) Prevailing building codes, commercial industry standards for loading criteria, health and life safety, design, engineering, construction, and materials, and recognized engineering practices should be sufficient to preserve the Government's interest in the plumbing system's performance and integrity. No additional provisions should be necessary unless special conditions or requirements are present.

(3) Consider any known requirements (and describe the appropriate requirements in the RFP) or anticipated changes in the plumbing system throughout the facility's life, including, but not limited to the following. See sec. 4-10.e., below.

c. If Direct Payment for MAINTENANCE/REPAIR/RENOVATION Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain a high degree of interest in the integrity, longevity, and maintainability of the facility's plumbing systems. See 4-10.a., above, relative to plumbing system design and materials.

(2) Commercial industry standards for the design, engineering, construction, and materials, and recognized architectural and engineering practices should suffice for preserving the Government's interests in facility maintainability. No additional provisions should be necessary unless special conditions or requirements are present.

(3) If maintenance work is to be performed by Government forces, consider the experience present in the various plumbing systems, and the availability of personnel skill levels, equipment, and materials to conduct the work. Include in the RFP any constraints on acceptable plumbing system components or materials.

(4) Describe in the RFP any limitations on inspection and other routine maintenance activities that may not be performed according to industry-recommended schedules or frequency. Describe what routine maintenance activities and frequencies can be anticipated.

(5) Consider accessibility to the plumbing distribution system, control valves, and components that might be repaired, upgraded, or modified throughout the life of the facility. Describe appropriate requirements in the RFP.

(6) Consider any known requirements (and describe appropriate requirements in the RFP) or foreseeable changes in the plumbing system and components during the facility's life, including, but not limited to:

(a) Anticipated or foreseeable change in occupancy type or classification

(b) Addition of special plumbing systems or components, or operations and mission, and how they impact the flexibility, adaptability, modifiability, and remodeling potential of the plumbing system

(c) Additions or major renovations to the building or utility systems.

(7) Consider requirements for building automation systems and their integration with plumbing components and systems including: controls for water heaters, pumps and equipment; engine generator or standby power systems; and miscellaneous building systems, including booster pumps, sump pumps, etc. Plumbing design, construction and materials should be governed by the prevailing building code and recognized engineering practice to the extent possible.

d. If Direct Payment for OPERATING/ENERGY/UTILITIES Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain a high degree of interest in the energy and operating expense of the facility. The plumbing system will impact the facility's energy and operating expense. Appropriate energy and water conservation standards should be sufficient to preserve the Government's interests in operating economy. Equipment performance standards, efficiency ratings, and insulation requirements for the plumbing system and components should be consistent with the overall facility energy budget and insulation requirements. Energy-related performance standards are published by model code organizations and industry associations as well as by USACE. Water conservation standards may also be established by the Installation or local jurisdiction. The Government must determine which standards are appropriate for the specific project.

(2) The RFP must describe occupancy characteristics that will affect the operating economy of the Plumbing System and its components. (See Appendix B.) Characteristics specific to the Plumbing System must be included, such as the peak hot water demand due to occupant schedules, male/female ratios, and local water supply or treatment restrictions. Describe conditions where the Army tenants are atypical of commercial facility occupants, such as occupancy schedules that will enable conservation measures.

(3) Describe requirements for building automation systems and their integration with plumbing components and systems. See 4-10.c., above.

e. If the Facility's Function Is Army Unique.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's plumbing systems and the accommodation of functions and activities uncommon to private commercial design and construction practice.

(2) The RFP must describe any special conditions or requirements that will be present for the project not addressed by the prevailing codes or commercial design, construction, and material standards and recognized engineering practices. See sec 4-10.a., above. These may include, but are not limited to:

- (a) Security; protection against intrusion or sabotage
- (b) Discharges or emissions from the facility or nearby facilities
- (c) Anticipated or foreseeable change in occupancy type or classification, addition of special plumbing systems or components, or operations and mission and how they impact the flexibility, adaptability, modifiability and remodeling potential of the plumbing system
- (d) Water supply or treatment restrictions that impact the selection of plumbing components
- (e) Special equipment requirements atypical to commercial facility types; who will supply the equipment
- (f) Occupancy types and schedules that are unique to the Army, including 24-hour use or extended periods of time where the building is unoccupied
- (g) Additions or major renovations to the building or utility systems.

f. If the Post Contract Disposition of the Facility Falls to the Government.

(1) The Government should maintain a high degree of interest in the facility's condition at the conclusion of the Third Party Contract. Provisions discussed under sec. 4-10.a-e., above, should be sufficient to preserve the Government's interests in assuming a serviceable facility.

(2) Consider access to plumbing components and systems for inspection prior to the Government's assumption of the facility. Describe the appropriate requirements in the RFP.

4-11. Heating, Ventilation, and Air Conditioning (HVAC)

a. General:

(1) HVAC system design, construction, and materials should be governed by the prevailing building code and recognized engineering practice to the extent possible. Appendix A displays sources of standards and criteria; reference Overall Facility Design, Roof Construction, and Exterior Closure criteria sources.

(2) Seismic support of mechanical distribution, equipment, and fixtures should be governed by the prevailing building code or seismic design code and recognized engineering practice to the extent possible.

(3) Define special environmental, climate and site-specific conditions that will have an impact on the HVAC system.

(4) The RFP must describe thermal loads and occupancy characteristics that will affect the design of the HVAC System and its components. (See Appendix B.) The following characteristics specific to the HVAC System must be included: numbers and types of occupants, schedules of use, chemicals and contaminants, equipment, lighting, fresh air requirements, filtration requirements, and profiles due to occupant schedules. Also note whether the facility will be unoccupied for extended periods of time, so conservation measures may be taken. Describe the appropriate energy conservation requirements in the RFP; see UTILITIES, below.

(5) Habitability requirements (such as lighting levels, temperature, humidity, privacy, air quality, acoustics [sound transmission and noise reduction], and ventilation) should be governed by the base energy conservation plan, the prevailing building code, or industry standards and recognized engineering practice to the extent possible.

(6) The RFP must describe any special conditions or requirements that will be present for the project that are not addressed by the prevailing codes or commercial design, construction, material and product standards. (See Appendix B.) These must include requirements specific to the HVAC system, such as security requirements, Army tenant's special equipment, opportunities for heat recovery, backup generators associated with specific systems, special conditioning requirements, and requirements for utilities and equipment location due to aesthetics or performance.

(7) Include in the RFP any requirements for building automation systems and their integration/interaction with HVAC components and systems, including: engine generator or standby power systems; uninterruptible power supply (UPS) systems; control systems on packaged equipment, including chillers, boilers, computer room HVAC, kitchen equipment, laboratory equipment, etc.; fire management systems, including detection and smoke control devices; maintenance management systems; HVAC timer and control systems; and miscellaneous building systems, including booster pumps, sump pumps, etc.

b. If Location Is On-Post.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's HVAC systems if the facility is located on an Army Installation. Serviceability, durability, and maintainability are primary considerations.

(2) Prevailing building codes, commercial industry standards for loading criteria, fire and life safety, design, engineering, construction, and materials, and recognized architectural and engineering practices should be sufficient to preserve the Government's interest in HVAC Systems' performance and integrity. No additional provisions should be necessary unless special conditions or requirements are present.

(3) Energy conservation requirements may be instituted to be consistent with the Installation's energy policy. See sec. 4-11.d., below.

(4) Any special conditions or requirements that will be present for the project not addressed by these criteria sources must be included in the RFP.

(5) Additional fire and life safety criteria promulgated by the Installation Fire Marshall may be applicable.

c. If Direct Payment for MAINTENANCE/REPAIR/RENOVATION Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain a high degree of interest in the integrity, longevity, and maintainability of the facility's HVAC systems and components. See 4-11.a., above, relative to HVAC system design and equipment.

(2) Commercial industry standards for the design, engineering, construction, and materials, and recognized architectural and engineering practices should suffice to preserve the Government's interests in HVAC systems' maintainability. No additional provisions should be necessary unless special conditions or requirements are present.

(3) If maintenance work is to be performed by Government forces, consider the experience present in the various HVAC systems, and the availability of personnel skill levels, equipment, and materials to conduct the work. Include in the RFP any constraints on acceptable HVAC system components or materials.

(4) Describe in the RFP any limitations on inspection and other routine maintenance activities that may not be performed according to industry-recommended schedules or frequency. Describe what routine maintenance activities and frequencies can be anticipated.

(5) Consider accessibility to the HVAC distribution system, controls, and components which might be repaired, upgraded or modified throughout the life of the facility. Describe appropriate requirements in the RFP.

(6) Consider any known requirements (and describe the appropriate requirements in the RFP) or anticipated changes in the HVAC distribution system and components during the facility's life, including, but not limited to:

(a) Addition of computers, personnel, operations or equipment to the facility that will require additional cooling, heating, humidity control, contaminant filtration, etc.

(b) Utility routing; interface with fire-resistive barriers

(c) Change in occupancy type or classification

(d) Additions or major renovations to the building or utility systems.

d. If Direct Payment for OPERATING/ENERGY/UTILITIES Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain a high degree of interest in the energy and operating expense of the facility. The HVAC system will impact the facility's energy and operating expense. Appropriate energy conservation standards should be sufficient to preserve the Government's interests in operating economy. Equipment performance standards and insulation requirements for the HVAC system and components should be consistent with the overall facility energy budget and insulation requirements. Energy-related performance standards are published by model code organizations and industry associations as well as by USACE. The Government must determine which standards are appropriate for the specific project. HVAC design, construction and materials should be governed by the prevailing building code and recognized engineering practice to the extent possible.

(2) In cases where the Government is not directly responsible for paying operating and utility expenses, energy-related performance standards may be appropriate as an example of the Government's sensitivity to resource conservation and community responsibility. The Government must determine the advisability of invoking this requirement.

(3) Consider requirements for building automation systems and their integration with HVAC components and systems including: engine generator or standby power systems; uninterruptible power supply (UPS) systems; control systems on packaged equipment, including chillers, boilers, computer room HVAC, kitchen equipment, laboratory equipment, etc.; fire management systems, including detection and smoke control devices; maintenance management systems; HVAC timer and control systems; and miscellaneous building systems, including booster pumps, sump pumps, etc.

(4) Indicate any known requirements or foreseeable changes throughout the facility's life that will impact operating efficiency and cost of the HVAC System. See sec. 4-11.e., below. Describe the appropriate requirements in the RFP.

e. If the Facility's Function Is Army Unique.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's HVAC systems and components, and the accommodation of functions and activities uncommon to private commercial design and construction practice.

(2) The RFP must describe any special conditions, requirements or anticipated changes that will be present for the project that are not addressed by the prevailing codes or commercial design, construction, and material standards and recognized engineering practices. See 4-11.a., above. These may include, but are not limited to:

(a) Occupancy types and schedules that are unique to the Army, such as 24-hour use, or extended periods of time where the facility is unoccupied

(b) Change in occupancy type or classification, equipment, operations, or mission

(c) Additions or major renovations to the building or utility systems

(d) Environmental, climate, and site-specific conditions that will have an impact on the HVAC System design

(e) Special design and equipment requirements, who will supply the equipment, and the anticipated impact on the HVAC Systems

(f) Security; protection against intrusion or sabotage

(g) Discharges or emissions from the facility or nearby facilities.

(3) Consider requirements for building automation systems and their integration with HVAC components and systems. See GENERAL, above.

f. If the Post-Contract Disposition of the Facility Falls to the Government.

(1) The Government should maintain a high degree of interest in the facility's condition at the conclusion of the Third Party Contract. Provisions discussed under sec. 4-11.a-e., above, should be sufficient to preserve the Government's interests in assuring a serviceable facility at the conclusion of the contract.

(2) Consider access to HVAC components and systems for inspection prior to the Government's assumption of the facility. Describe the appropriate requirements in the RFP.

4-12. Special Mechanical Equipment.

a. General.

(1) The design, installation, and materials involved with fire suppression and other Special Mechanical Systems should be governed by the prevailing building code and recognized engineering

practice to the extent possible. Appendix A gives sources of standards and criteria; reference Overall Facility Design, Special Mechanical Equipment, and Fire Protection System criteria sources.

(2) Seismic support of fire suppression and other special mechanical systems should be governed by the prevailing building code or seismic design code and recognized engineering practice to the extent possible.

(3) The RFP must describe occupancy characteristics that will affect the design of the Special Mechanical System and its components. (See Appendix B.) Characteristics specific to Special Mechanical Systems must be described, such as hazard classification, any constraints on types of fire suppression systems, process equipment and distribution requirements, special chemical, or liquid or gaseous material supply or discharge control systems. Describe circumstances where the Army tenant's functions or activities are atypical of comparable commercial facility occupants.

(4) The RFP must describe any special conditions or requirements that will be present for the project not addressed by the prevailing codes or commercial design, construction, material, and product standards. (See Appendix B.) These must include requirements specific to Special Mechanical Equipment, such as special occupancy characteristics, security requirements, hazard classifications, and local fire and emergency response capabilities and constraints.

(5) Describe any special environmental, climate and site-specific conditions that will have an impact on the Special Mechanical System. Include the appropriate requirements in the RFP.

b. If the Location Is On-Post.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's Special Mechanical Systems if the facility is located on an Army Installation. Serviceability, durability, and maintainability are primary considerations.

(2) Prevailing building codes, commercial industry standards for fire and life safety, design, engineering, construction, and materials, and recognized engineering practices should be sufficient to preserve the Government's interest in special mechanical systems' performance. No additional provisions should be necessary unless special conditions or requirements are present.

(3) Describe any special environmental, climate and site-specific conditions that will have an impact on the Special Mechanical System. Describe Installation fire and emergency response capabilities and constraints. Describe Installation facility security requirements and practices that may impact fire suppression and emergency response actions. Include the appropriate requirements in the RFP.

(4) Additional fire and life safety criteria promulgated by the Installation Fire Marshall may be applicable.

c. If Direct Payment for MAINTENANCE/REPAIR/RENOVATION Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain a high degree of interest in the integrity, longevity, and maintainability of the facility's Special Mechanical and Fire Protection Systems. See 4-12.a., above. Inspection and verification of these systems' performance, especially emergency systems, is of primary importance.

(2) Commercial industry standards for the design, engineering, construction, and materials, and recognized architectural and engineering practices should suffice to preserve the Government's interests

in facility maintainability. No additional provisions should be necessary unless special conditions or requirements are present.

(3) If maintenance work is to be performed by Government forces, consider the experience present in the various Special Mechanical Systems, and the availability of personnel skill levels, equipment, and materials to conduct the work. Include in the RFP any constraints on acceptable Special Mechanical System and Fire Protection system components or materials.

(4) Describe in the RFP any limitations on inspection and other routine maintenance activities that may not be performed according to industry-recommended schedules or frequency. Describe what routine maintenance activities and frequencies can be anticipated.

(5) Consider accessibility to the Special Mechanical System and Fire Protection system, controls, and components that might be repaired, upgraded, or modified throughout the life of the facility. Describe appropriate requirements in the RFP.

(6) Consider any known requirements (and describe appropriate requirements in the RFP) or foreseeable changes that will impact the Special Mechanical Systems during the facility's life, including, but not limited to:

(a) Addition of computers, personnel, flammable or hazardous materials, operations, or equipment to the facility

(b) Utility routing; interface with fire-resistive barriers

(c) Change in occupancy type or classification

(d) Additions or major renovations to the building or utility systems.

d. If Direct Payment for OPERATING/ENERGY/UTILITIES Is the GOVERNMENT'S Responsibility. The Special Mechanical Systems' impact on the facility's energy and operating expense should be relatively minor. Design and installation according to prevailing building codes and standards should be sufficient to ensure acceptable energy and operating economy.

e. If the Facility's Function Is Army Unique.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's Special Mechanical Systems and components, and the accommodation of functions and activities uncommon to private commercial design and construction practice.

(2) The RFP must describe any special conditions or requirements that will be present for the project that are not addressed by the prevailing codes or commercial design, construction, and material standards and recognized engineering practices. See 4-12.a&b., above.

(3) Consider any anticipated changes that will impact the Special Mechanical Systems during the facility's life. See 4-12.c., above.

f. If the Post Contract Disposition of the Facility Falls to the Government.

(1) The Government should maintain a high degree of interest in the facility's condition at the conclusion of the Third Party Contract. Provisions discussed under 4-12.a-e., above, should be sufficient to preserve the Government's interests in assuming a serviceable facility.

(2) Consider access to Special Mechanical Systems and components for inspection and verification of performance to the Government's assumption of the facility. Describe the appropriate requirements in the RFP.

4-13. Interior Electrical

a. General.

(1) Interior Electrical system design, construction and materials should be governed by the prevailing building code and recognized engineering practice to the extent possible. Appendix A gives sources of standards and criteria; reference Overall Facility Design and Interior Electrical System criteria sources.

(2) Handicapped accessibility, where required, should be governed by the prevailing national accessibility standards.

(3) Seismic design should be governed by the prevailing building code or seismic design code and recognized engineering practice to the extent possible.

(4) Energy conservation requirements should be governed by the Base energy conservation plan, the prevailing building code, or industry standards and recognized engineering practice to the extent possible. See discussion on 4-13.d., below.

(5) The RFP must describe occupancy characteristics that will affect the design of the Interior Electrical System and its components. (See Appendix B.) Include characteristics specific to the Interior Electrical System, such as numbers and types of occupants, schedules of use, lighting profiles, activities that demand special lighting or power supply, power quality, requirements for power and electronic distribution routing, protection, and isolation, and any special equipment used in the facility. Indicate whether the facility must be metered. Describe the Army tenant's functions or activities atypical of commercial facility occupants.

(6) Describe any requirements for office automation requirements and building automation systems and their integration/interaction with Interior Electrical components and systems, including: electrical, engine generator or standby power systems; uninterruptible power supply (UPS) systems; interior and exterior lighting, and lighting control systems, etc.

(7) The RFP must describe any special conditions or requirements that will be present for the project that are not addressed by the prevailing codes or commercial design, construction, material and product standards. (See Appendix B.) Include requirements specific to the Interior Electrical System, such as security requirements, power requirements for special equipment, backup requirements, and requirements for dedicated power to equipment and circuit organization.

b. If the Location Is On-Post.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's Interior Electrical Systems if the facility is located on an Army Installation. Serviceability, durability, and maintainability are primary considerations.

(2) Prevailing building codes, commercial industry standards for demand criteria and calculations, fire and life safety, design, engineering, construction, and materials, and recognized engineering practices should be sufficient to preserve the Government's interest in structural performance

and integrity. No additional provisions should be necessary unless special conditions or requirements are present.

(3) The RFP must describe any special conditions or requirements relative to on-post conditions not addressed by the prevailing codes or commercial design, construction, material and product standards. See discussions in 4-13.a., above.

(4) Additional fire and life safety criteria promulgated by the Installation Fire Marshall may be applicable.

c. If Direct Payment for MAINTENANCE/REPAIR/RENOVATION Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain a high degree of interest in the integrity, longevity, and maintainability of the facility's Electrical System and components. See the discussion in 4-13.a., above.

(2) Commercial industry standards for the design, engineering, construction, and materials, and recognized architectural and engineering practices should suffice to preserve the Government's interests in facility maintainability. No additional provisions should be necessary unless special conditions or requirements are present.

(3) If maintenance work is to be performed by Government forces, consider the experience present in the various Electrical Systems, and the availability of personnel skill levels, equipment, and materials to conduct the work. Include in the RFP any constraints on acceptable Interior Electrical System components or materials.

(4) Describe in the RFP any limitations on inspection and other routine maintenance activities that may not be performed according to industry-recommended schedules or frequency. Describe what routine maintenance activities and frequencies can be anticipated.

(5) Consider accessibility to the Electrical System's controls and components which might be repaired, upgraded or modified throughout the life of the facility. Describe appropriate requirements in the RFP.

(6) Consider any known requirements (and describe appropriate requirements in the RFP) or foreseeable changes that will impact the facility and Electrical System during the facility's life, including, but not limited to:

- (a) Addition of computers, personnel, activities, operations, or equipment to the facility
- (b) Change in occupancy type or classification
- (c) Penetrations by electrical and electronic distribution through fire-resistive construction
- (d) Additions or major renovations to the building or utility systems.

d. If Direct Payment for OPERATING/ENERGY/UTILITIES Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain a high degree of interest in the energy and operating expense of the facility. The HVAC system will impact the facility's energy and operating expense. Appropriate energy conservation standards should be sufficient to preserve the Government's interests in operating economy. Lighting and electrical equipment efficiency and performance standards should be consistent with the overall facility energy budget and insulation requirements. Energy-related performance standards are published by model code organizations and industry associations as well as by USACE. The

Government must determine which standards are appropriate for the specific project. Electrical design, equipment, materials, and installation should be governed by the prevailing building code and recognized engineering practice to the extent possible. Appendix A shows sources of standards and criteria; reference Overall Facility Design, and Interior Electrical criteria sources.

(2) In cases where the Government is not directly responsible for paying operating and utility expenses, energy-related performance standards may be appropriate as an example of the Government's sensitivity to resource conservation and social responsibility. The Government must determine the advisability of invoking this requirement.

(3) Consider requirements for office and building automation systems and their contribution to the facility's operating economy. See 4-13.a., above, relative to requirements or options for these systems. Include the appropriate requirements in the RFP.

(4) Consider any known requirements or foreseeable changes that will impact the electrical demand during the facility's life, such as changes in occupants, activities, or equipment. Include the appropriate requirements in the RFP.

e. If the Facility's Function Is Army Unique.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's Interior Electrical systems and components, and the accommodation of functions and activities uncommon to private commercial design and construction practice.

(2) The RFP must describe any special conditions or requirements that will be present for the project not addressed by the prevailing codes or commercial design, construction, and material standards and recognized engineering practices. See 4-13.a., above. These may include, but are not limited to:

(a) Occupancy types and schedules that are unique to the Army

(b) Special equipment

(c) Special environmental, climate, and site-specific conditions that will have an impact on the Electrical System's design and operation

(d) Security; protection against intrusion or sabotage.

(3) Consider any anticipated changes that will impact the functionality of the Electrical System during the facility's life. See discussion in 4-13.c., above.

f. If the Post-Contract Disposition of the Facility Falls to the Government.

(1) The Government should maintain a high degree of interest in the facility's condition at the conclusion of the Third Party Contract. Provisions discussed under 4-13.a-e., above, should be sufficient to preserve the Government's interests in assuming a serviceable facility.

(2) Consider access to the Interior Electrical Systems and components for inspection prior to the Government's assumption of the facility. Describe the appropriate requirements in the RFP.

4-14. Special Interior Electrical

a. General.

(1) The design and installation of sound, alarm, television, and other Special Interior Electrical Systems should be governed by the prevailing building code and recognized engineering practice to the extent possible. Appendix A shows sources of standards and criteria; reference Overall Facility Design and Special Interior Electrical System criteria sources.

(2) Handicapped accessibility, where required, should be governed by the prevailing national accessibility standards.

(3) The RFP must describe occupancy characteristics that will dictate the design of the Special Interior Electrical System and its components. (See Appendix B.)

(4) The RFP must describe any special conditions or requirements that will be present for the project not addressed by the prevailing codes or commercial design, construction, material, and product standards. (See Appendix B.) These must include requirements specific to the Special Interior Electrical systems.

b. If the Location Is On-Post.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's Special Interior Electrical Systems if the facility is located on an Army Installation. Serviceability, durability, and maintainability are primary considerations.

(2) Prevailing building codes, commercial industry standards for loading criteria, fire and life safety, design, engineering, construction, and materials, and recognized architectural and engineering practices should be sufficient to preserve the Government's interest in the performance and integrity of sound, alarm, television, communications, and other electronic systems. No additional provisions should be necessary unless special conditions or requirements are present.

(3) Describe requirements for compatibility with communications, security, detection, alarm, and other Special Interior Electrical Systems with existing Installation equipment. (See Appendix B.)

c. If Direct Payment for MAINTENANCE/REPAIR/RENOVATION Is the GOVERNMENT'S Responsibility.

(1) The Government should maintain a high degree of interest in the integrity, longevity, and maintainability of the facility's Special Interior Electrical System and components. See 4-14.a., above.

(2) Commercial industry standards for the design, engineering, construction, and materials, and recognized architectural and engineering practices should suffice to preserve the Government's interests in facility maintainability. No additional provisions should be necessary unless special conditions or requirements are present.

(3) If maintenance work is to be performed by Government forces, consider the experience present in the various Special Interior Electrical Systems, and the availability of personnel skill levels, equipment, and materials to conduct the work. Include in the RFP any constraints on the acceptability of the Special Interior Electrical Systems, components, or materials.

(4) Describe in the RFP any limitations on inspection and other routine maintenance activities that may not be performed according to industry-recommended schedules or frequency. Describe what routine maintenance activities and frequencies can be anticipated.

(5) Consider accessibility to the Special Interior Electrical System, controls, and components that might be repaired, upgraded or modified throughout the life of the facility. Describe appropriate requirements in the RFP.

(6) Consider any known requirements or foreseeable changes that will impact the Special Interior Electrical System during the facility's life, including, but not limited to the following. Provide adequate utility highways through fire walls to accommodate future changes. Describe appropriate requirements in the RFP, including, but not limited to:

- (a) Penetration by electrical and electronic distribution through fire-resistive construction
- (b) Addition of computers, personnel, activities, operations or equipment to the facility
- (c) Change in occupancy type or classification
- (d) Additions or major renovations to the building or utility systems.

d. If Direct Payment for OPERATING/ENERGY/UTILITIES Is the GOVERNMENT'S Responsibility. The Government should maintain a high degree of interest in the operating economy of the facility. Special Interior Electrical Systems, however, will generally have a minor effect on a facility's energy use and operating expense.

e. If the Facility's Function Is Army Unique.

(1) The Government should maintain a high degree of interest in the integrity and long-term performance of the facility's Special Interior Electrical Systems and components, and the accommodation of functions and activities uncommon to private commercial design and construction practice.

(2) The RFP must describe any special conditions or requirements that will be present for the project that are not addressed by the prevailing codes or commercial design, construction, and material standards and recognized engineering practices. See 4-14.a, above. These may include, but are not limited to:

- (a) Occupancy types and schedules unique to the Army
- (b) Special environmental, climate, and site-specific conditions that will have an impact on the Special Interior Electrical System
- (c) Security; protection against intrusion or sabotage.

(3) Consider any anticipated changes that will impact the Special Interior Electrical System during the facility's life. See discussion in 4-14.c., above.

f. If the Post-Contract Disposition of the Facility Falls to the Government.

(1) The Government should maintain a high degree of interest in the facility's condition at the conclusion of the Third Party Contract. Provisions discussed under 4-14.a-e., above, should be sufficient to preserve the Government's interests in assuming a serviceable facility.

(2) Consider access to the Special Interior Electrical Systems and components for inspection prior to the Government's assumption of the facility. Describe the appropriate requirements in the RFP.

5. PREPARING TECHNICAL REQUIREMENTS FOR THIRD PARTY CONTRACT REQUESTS FOR PROPOSALS

5-1. General

a. Purpose of Technical Requirements. As the facility's owner, the Third Party Contractor will be responsible for the facility's design. As such, the Third Party Contractor must also establish design and engineering criteria according to his/her own economic and operational objectives. The purpose of including the technical requirements in the RFP is to ensure the safety and engineering integrity of the facility, as well as the functional responsiveness to the Army occupant as a tenant to the Third Party Contractor. Chapter 4 provides guidance on determining the appropriate content of the technical requirements.

a. Multi-Tenant Facilities. There may be cases where the Third Party Contractor may design and construct a multi-tenant facility. In these cases, when the Army is not the sole tenant, the Army's and USACE construction agent's interests would be confined to the space occupied by the Army tenant.

b. Objectives of a TPC RFP. When preparing technical requirements for Third Party Contract RFPs, two objectives must be observed. One principle of the Third Party Contracting approach is to facilitate an economical design and construction solution by avoiding restrictive criteria and constraints on the contractor. The USACE construction agent, however, must also ensure the safety, quality, and comfort of the facility, and an environment conducive to the Army occupant's mission performance. Specifications should be applied selectively and limited to features of the facility's design that will be critical to health, safety, and functional responsiveness.

c. Criteria Sources. This chapter describes industry-accepted, non-USACE sources of design, engineering, and construction guidance that are commonly applied to facilities in the private market. This guidance would be observed by the prudent Architect/Engineer in general commercial (i.e., non-federal) practice to achieve the appropriate safety, performance, and quality. It is readily available and familiar to design and construction professionals. By using these sources as the basis for the technical requirements, the USACE construction agent (or contracted AE services) should be able to ensure safety and functionality. These sources should also allow cost competitiveness relative to private construction by avoiding unique or restrictive criteria not normally observed in private construction.

5-2. Design and Construction Criteria Sources

a. Criteria Sources. Guidance and criteria are promulgated through numerous sources in the commercial construction industry. This section describes the general types of guidance applicable to facility design and construction, which may be applied to a Third Party Contracted facility. The following sections describe criteria sources applicable to the various disciplines and systems involved in a facility design and construction project.

b. Codes. Codes are the basic provisions for the preservation of occupant and public safety and health. "Codes" usually refer to Model Building Codes and widely recognized health- and safety-oriented standards. Codes are generally promulgated by independent standards-setting organizations.

c. Design Standards. Design standards are the provisions defining minimum levels of acceptability for an intended occupant or purpose, such as facility content, configuration, spatial and dimensional requirements, etc. Design standards are generally oriented towards levels of acceptability for an intended user rather than basic occupant or public safety and health.

d. Engineering Standards. Engineering standards are the provisions defining the basic engineering design or performance of facilities or systems, generally oriented toward quality or performance, sufficiency and integrity for occupant, and toward public health and safety. Standards may be developed without regard to the type or composition of the system. (For example, American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) 90.1 defines design parameters for temperature, air movement, thermal resistance, etc, regardless of type of mechanical system.) Standards may also regulate the engineering design applicable to specific items (EXAMPLE: ACI 318 defines design methods and practice for reinforced concrete construction). Engineering standards are generally promulgated by industry organizations or independent standards-setting organizations.

e. Product/Material Standards. Product/material standards are provisions defining minimum acceptable levels of quality for an intended purpose in materials, products, etc; generally oriented toward product quality/performance, and possibly toward safety and health as well. Product and material standards are generally promoted by the industry (suppliers or organizations) involved with the specific items, or by independent standards-setting organizations.

f. Product/Material Specifications. Product/material specifications are provisions defining specific requirements for material or product composition and quality created to reflect the expectations of an owner for a specific facility. Specifications are prepared on a project-specific basis, although master guide specifications are available from independent professional and industry organizations.

g. USACE Criteria (CEGS, etc). USACE criteria are provisions defining specific requirements of material or product composition and quality to reflect the expectations of USACE as construction agent for the Army. Sometimes USACE criteria are not "standard" within the industry at large.

5-3. Design Requirements

a. General. The RFP must convey the Army tenant's design requirements to the Third Party Contractor. These include the programmatic, spatial, and compositional requirements, and description of features necessary for the Army tenant to perform its mission.

b. Composition and Content. The composition and content of design requirements depend on the project-specific conditions and requirements. Chapter 4 provides guidance on determining design requirement contents. It is critical for the USACE construction agent to completely and accurately convey the functional requirements of the Army tenant. However, restrictions to specific configurations must be avoided. Design requirements should generally be described by verbal and tabular means, possibly supplemented by schematic-type graphics if necessary. Floor plans, elevations, sections, and other architectural drawings should be avoided. Exceptional cases, however, may require including definitive design guidance for certain features of the facility if a specific configuration is critical to the Army tenant's mission performance.

c. Recommended Format. Appendix B describes a recommended format and content for providing design requirements in a Third Party Contract RFP. This format provides a representative list that must be tailored for each project; items are to be added, amended, or deleted as appropriate. It must be emphasized that design requirements must reflect the functional and mission performance requirements of the Army tenant and not a predisposition toward any specific design configuration. This format is summarized as follows:

(1) Facility Description. A general description of the facility's purpose and functions; activities, occupancy characteristics, and organizational features.

(2) Site Data. For facilities located on-post, existing site drawings and data.

(3) Site Design Parameters. Functions and activities that will dictate site design. For facilities located on-post, any master planning considerations that will affect the site or facility's design.

(4) Building Design. Overall architectural design and interior design considerations. Architectural program and detailed functional requirements for each space/area of the building.

(5) Life-Cycle Considerations: Considerations for adaptability to mission, occupant, and functional changes that are likely throughout the duration of the contract.

5-4. Building Design Criteria Sources.

a. General Building Design Criteria. The following sources are applicable to the overall building design:

(1) American National Standards Institute (ANSI). A117.1 Buildings and Facilities—Providing Accessibility and Usability for Physically Handicapped People.

(2) American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE). 90.1 Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings.

(3) Building Officials and Code Administrators (BOCA).

- (a) Basic/National Building Code.
- (b) Basic/National Energy Conservation Code.

(4) International Council of Building Officials (ICBO). Uniform Building Code.

(5) National Fire Protection Association (NFPA).

- (a) 24 Installation of Private Fire Service Mains and Their Appurtenances.
- (b) 80A Protection of Buildings from Exterior Fire Exposures.
- (c) 101 Code for Safety to Life from Fire in Buildings and Structures.

(6) Southern Building Code Congress, Inc. (SBCCI). Standard Building Code.

b. Additional Hazardous Occupancies. The above listed criteria apply to ordinary building occupancies and classifications. Additional criteria may apply relative to special or hazardous occupancies. Consult NFPA National Fire Codes. The USACE construction agent (or contracted A/E services) must identify the appropriate criteria per project-specific occupancy requirements.

c. Army Installation Design Criteria. If the facility is located on-post, building height, separation, emergency equipment access, and other fire safety-related features will be regulated by the Installation Fire Marshall, and may be different from Model Building Code criteria. The Installation Design Guide should govern siting, site planning, and architectural composition of the facility.

d. Facility Design on Private Land. If the facility is located off-post, design will also be governed by the prevailing zoning and building ordinances and covenants.

e. Army-Unique Facility Design Criteria. Other overall building design requirements that are critical to the Army tenant's mission performance and unique to the Army generally will not be addressed in commercial design criteria sources. In these cases, the prevailing Army or USACE design criteria sources should be consulted. There may also be criteria applicable to supporting utilities and conditions present at the specific installation. These may include electric power and distribution, water and sewer,

gas supply, steam, and/or hot water generation and distribution, telephone and data lines, energy management and control systems (EMCS), television, fire alarm systems, and intrusion detection systems. The RFP must include a complete and accurate description of existing conditions and requirements for their interface with new construction. The RFP must also provide a complete and accurate description of systems and services which will be the responsibility of the Government, and those which will be the responsibility of the Contractor under the TPC contract.

5-5. Engineering and Construction Requirements.

Performance-type specifying is necessary for a Third Party Contracted facility. Restrictions to specific configurations, systems, products, and materials must be avoided unless absolutely critical to the Army tenant and function of the facility. The composition and content of specifications is dependent on the conditions and requirements of each specific facility and project. Chapter 4 provides guidance on determining specification contents.

5-6. Specification Format

A systems-oriented format is preferred over a material-oriented format for performance-type specifying in most cases. The Building Systems Index as used by the Corps Automated Cost Estimating System (CACES) provides a convenient format that may be tailored as specific project conditions dictate. The major headings and subheadings are as follows:

a. Substructure.

- (1) Column foundation
- (2) Concrete footings
- (3) Foundation walls
- (4) Slab on grade.

b. Structural Frame.

- (1) Roof construction
- (2) Roof deck.

c. Roof Construction.

- (1) Roof coverings
- (2) Roof flashing
- (3) Roof openings.

d. Exterior Closure.

- (1) Exterior wall
- (2) Interior skin construction
- (3) Soffits & fascia
- (4) Exterior finishes
- (5) Sun control devices
- (6) Exterior metal doors
- (7) Exterior glazed doors
- (8) Operable windows
- (9) Fixed windows.

e. Interior Construction.

- (1) Interior partitions
- (2) Interior glazed doors
- (3) Interior wood doors
- (4) Interior windows.

f. Interior Finishes.

- (1) Gypsum board
- (2) Liquid finishes
- (3) Wallpaper & plaster
- (4) Gypsum ceiling
- (5) Paint ceiling
- (6) Ceiling plaster.

g. Specialties.

- (1) Toilet & bath
- (2) Cabinetry
- (3) Shelving
- (4) Identification devices
- (5) Other specialties
- (6) Railings.

h. Plumbing.

- (1) Plumbing fixtures
- (2) Underground plumbing
- (3) Aboveground plumbing

- (4) Excavation
 - (5) Hot water
 - (6) Cold water
 - (7) Water service
 - (8) Excavation
 - (9) Water heaters
 - (10) Pumps
 - (11) Tanks
 - (12) Equipment
 - (13) Other equipment.
- i. HVAC.
- (1) Equipment meters, & regulators
 - (2) Heating system
 - (3) Distribution piping
 - (4) Cooling system
 - (5) Distribution system
 - (6) Conditioned air system
 - (7) Fixtures
- (8) Distribution ductwork
 - (9) Exhaust system
 - (10) Testing & balancing.
- j. Special Mechanical Equipment.
- (1) Fire protection system.
- k. Interior Electrical.
- (1) Service & distribution system
 - (2) Power systems
 - (3) Lighting systems.
- l. Special Interior Electrical.
- (1) Sound systems
 - (2) Alarm systems
 - (3) Television (TV) systems
 - (4) Time systems.

Within each of these headings or subheadings the appropriate design, engineering, and construction guidance can be provided by original text, text extracted from another source, or by reference.

5-7. Engineering and Construction Criteria Sources

a. Criteria Source Document. Appendix A provides a source document for developing specifications for a Third Party Contracted facility. It is intended that only selected criteria sources would be applied to any single project. It is critical that the specifier thoroughly review these sources for applicability to the specific project and locale. Frequently, more than one source will apply to a building system or component. The specifier must identify the criteria best suited to the project at hand.

(1) It is recommended that reference-type specifying be used to the extent possible. Cite the appropriate criteria source or document by reference number and title. Omit references to a specific edition or date of issue, unless that specific edition is the desired reference. Indicate that the most current edition of the cited document is implied unless otherwise noted. Further additions or amendments of accepted industry criteria and standards should be made only when critical to the Army tenant and facility's function. Where the source document includes options (such as grades, values, ratings, etc), the desired options must be cited in the specification. Original text may be developed to convey the basic performance requirements contained in the appropriate references when necessary.

(2) The specifier should reference the highest level of guidance appropriate for the specific project conditions. Code- and standards-level criteria should be referenced wherever possible. Specifications-level guidance should be included only where necessary. USACE criteria may be incorporated into the specification where no other source of criteria will suffice for the intended purpose. If CEGS and other USACE or Army criteria not commonly available on the commercial market are included, they should appear in full text and not simply by reference.

(3) DOD and Army regulation, and DOD, Army, and USACE engineering and construction criteria may be incorporated into the specification for Army-unique features where no other sources of criteria are available or are suitable for the intended purposes. If CEGS or Army regulations or criteria

not commonly available on the commercial market are included, they should appear in full text and not simply by reference.

b. USACE Criteria. USACE criteria (Corps of Engineer Guide Specifications [CEGS], Engineering Manuals, etc.) are not included in this listing. It is presumed that USACE personnel are sufficiently proficient with these sources and no further discussion is necessary for this report.

6 CONCLUSION

This project has developed and documented consistent standards for personnel preparing the technical requirements included in RFPs for Third-Party Contracted Army facilities. This study has drawn upon existing TPC laws, regulations, and procedures, interviews, and lessons learned from TPC projects to develop rule-type processes to associate variables in a TPC project with advice on the appropriate composition of the technical requirements. Factors affecting the composition of design and technical criteria included in an RFP were considered, and matrixes were developed to assist in associating features of specific TPC projects with the appropriate design and technical guidance. Sources for obtaining design and technical criteria, and for accessing the appropriate advice applicable to TPC facilities were documented.

APPENDIX A: Engineering and Construction Criteria Sources

This Appendix provides a source document for industry-accepted, non-USACE design, engineering, and construction guidance commonly applied to facilities in the private market. It is intended that only selected criteria sources would be applied to any single project. It is critical for the specifier to thoroughly review these sources for applicability to the specific project and locale. Frequently, more than one source will apply to a building system or component. The specifier must identify the criteria best suited to the project at hand. Each project specification must then be completed according to project-specific conditions.

A-1. APPENDIX CONTENTS

This Appendix follows the USACE CACES Building Systems Index. Criteria are contained according to the following format:

A-2. OVERALL FACILITY DESIGN AND CONSTRUCTION

A-3. SUBSTRUCTURE

- Concrete Substructure
- Masonry Substructure
- Waterproofing, Vapor Retarders
- Joint Sealers

A-4. STRUCTURAL FRAME

- Concrete Superstructure.
- Masonry Superstructure
- Structural Steel Superstructure
- Cold Formed Metal Framing Superstructure
- Structural Aluminum Superstructure
- Metal Fabrications
- Metal Stairs
- Grating and Floor Plates
- Building Expansion Joint Covers
- Fireproofing
- Joint Sealers

A-5. ROOF CONSTRUCTION

- General
- Vapor Retarders
- Insulation
- Fireproofing
- Roof Coverings
- Traffic Topping
- Prefabricated Roof Specialties
- Roof Accessories
- Skylights
- Joint Sealers

A-6. EXTERIOR CLOSURE

- General

- Exterior Wall

 - General

 - Masonry Wall Construction

 - Cold Formed Metal Framing Wall Construction

 - Wood Frame Wall Construction

 - Waterproofing, Vapor Retarders

 - Insulation

 - Fireproofing

- Joint Sealers

- Soffits and Fascia

- Exterior Finishes

 - Glass Fiber Reinforced Concrete

 - Architectural Precast Concrete

 - Brick Unit Masonry

 - Stone

 - Shop Fabricated Masonry Panels

 - Exterior Insulation & Finish Systems

 - Composite Building Panels

 - Siding

- Exterior Metal Doors

- Wood Doors

- Exterior Glazed Doors

- Entrances, Storefronts, Revolving Doors

- Door Hardware

- Automatic Door Equipment

- Windows

- Glazing and Glazed Curtain Walls

A-7. INTERIOR CONSTRUCTION

- Interior Partitions

 - Masonry Wall Construction

 - Cold Formed Metal Framing Wall Construction

 - Wood Frame Wall Construction

 - Demountable, Moveable, or Operable Partitions

- Interior Wood Doors

- Interior Glazed Doors

- Door Hardware

- Automatic Door Equipment

- Access Flooring

A-8. INTERIOR FINISHES

- Gypsum Board

- Liquid Finishes/Paints

- Wall Coverings and Surfaces

- Plaster

- Ceilings

- Flooring

A-9. PLUMBING

- General
- Plumbing Fixtures
- Aboveground Plumbing
- Plumbing Equipment

A-10. HVAC

- General
- Heating System
- Distribution Piping and Systems
- Cooling System
- Conditioning Air System
- Distribution Ductwork
- Exhaust System
- Testing and Balancing
- Swimming

A-11. SPECIAL MECHANICAL EQUIPMENT

- Fire Protection Systems

A-12. INTERIOR ELECTRICAL

- General
- Service and Distribution Systems
- Power Systems
- Lighting Systems
- Lightning Protection Systems

A-13. SPECIAL INTERIOR ELECTRICAL

- General
- Alarm Systems
- Fire Alarm and Smoke Detection
- Intrusion Detection and Security

A-2. OVERALL FACILITY DESIGN AND CONSTRUCTION

The following guidance applies to the facility as a whole. All building systems, components, and materials, likewise, are also governed by this guidance.

American National Standards Institute (ANSI)

- A58.1 Minimum Design Loads for Buildings and Other Structures
- A117.1 Buildings and Facilities—Providing Accessibility and Usability for Physically Handicapped People

American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
90.1 Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings.

Building Officials and Code Administrators (BOCA)
Basic/National Building Code
Basic/National Energy Conservation Code

International Council of Building Officials (ICBO)
Uniform Building Code

National Fire Protection Association (NFPA)
24 Installation of Private Fire Service Mains and Their Appurtenances
80A Protection of Buildings from Exterior Fire Exposures
101 Code for Safety to Life from Fire in Buildings and Structures

Southern Building Code Congress, Inc. (SBCCI)
Standard Building Code

A-3. SUBSTRUCTURE

Concrete Substructure

Concrete Design and Construction, General

American Concrete Institute (ACI)
117 Standard Tolerances for Concrete Construction and Materials
211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
301 Specifications for Structural Concrete for Buildings
302.1R Guide for Concrete Floor and Slab Construction
303R Guide to Cast-in-Place Architectural Concrete
308 Standard Practice for Curing Concrete
304R Guide for Measuring, Mixing, Transporting, and Placing Concrete
304.3R Heavyweight Concrete: Measuring, Mixing, Transporting, and Placing
305R Hot Weather Concreting
306R Cold Weather Concreting
318 Building Code Requirements for Reinforced Concrete
523.1R Guide for Cast-In-Place Low-Density Concrete
544.3R Guide for Specifying, Mixing, Placing, and Finishing Steel Fiber Reinforced Concrete

Concrete Formwork

Occupational Safety and Health Administration (OSHA)
Subpart Q Concrete, Concrete Forms, and Shoring

International Conference of Building Officials (ICBO)
Section 2606 Formwork, Embedded Pipes, and Construction Joints

American Concrete Institute (ACI)
347 Recommended Practice for Concrete Formwork

American Plywood Association (APA)

V345 Concrete Forming

National Forest Products Association (NFoPA)

No. 3 Design of Wood Formwork for Concrete Structures

Western Wood Products Association (WWPA)

Catalog J Concrete Forms

Concrete Reinforcing

American Concrete Institute (ACI)

315-80 Details and Detailing of Concrete Reinforcement

SP-66 ACI Detailing Manual

American Welding Society (AWS)

D1.4 Structural Welding Code for Reinforcing Steel

D12.1 Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete Construction

Concrete Reinforcing Steel Institute (CRSI)

Manual of Standard Practice

63 Recommended Practice for Placing Reinforcing Bars

64 Recommended Practice for Placing Bar Supports, Specifications and Nomenclature

Concrete Curing

American Society for Testing and Materials (ASTM)

C 171 Sheet Materials for Curing Concrete

C 309 Liquid Membrane-Forming Compounds for Curing Concrete

D 2103 Polyethylene Film and Sheeting

In addition to the above, incorporate the following as applicable to alternative types of concrete construction.

Post Tensioned Structural Concrete

American Society for Testing and Materials (ASTM)

A 421 Uncoated Stress-Relieved Steel Wire for Prestressed Concrete

A 722 Uncoated High-Strength Steel Bar for Prestressing Concrete

A 416 Uncoated Seven-Wire Stress-Relieved Strand for Prestressed Concrete

Concrete Reinforcing Steel Institute (CRSI)

Manual of Standard Practice

63 Recommended Practice for Placing Reinforcing Bars

65 Recommended Practice for Placing Bar Supports, Specifications and Nomenclature

Structural Precast Concrete

American Concrete Institute (ACI)

- 512.1R Suggested Design of Joints and Connections in Precast Concrete
- 512.2R Precast Structural Concrete in Buildings
- 533.3R Fabrication, Handling and Erection of Precast Concrete Wall Panels
- 533.4R Design of Precast Concrete Wall Panels
- M-8 Precast Concrete: Handling and Erection

American Welding Society (AWS)

- D1.1 Structural Welding Code-Steel (ANSI/AWS D1.1)
- D1.4 Structural Welding Code-Reinforcing Steel (ANSI/AWS D1.4)

Prestressed Concrete Institute (PCI)

- JR-195 Precast Prestressed Concrete Industry Code of Standard Practice for Precast Concrete
- MNL-116 Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products
- MNL-120 PCI Design Handbook-Precast and Prestressed Concrete
- MNL-123 PCI Manual on Design of Connections for Precast Prestressed Concrete
- MNL-124 PCI Design for Fire Resistance of Precast Prestressed Concrete
- MNL-125 Plant Cast Precast and Prestressed Concrete-A Design Guide
- MNL-126 Manual for the Design of Hollow Core Slabs
- SPC-118 Guide Specification for Precast Prestressed Concrete for Buildings

Masonry Substructure

Mortar

American Society for Testing and Materials (ASTM)

- C 91 Specification for Masonry Cement
- C 144 Specification for Aggregate for Masonry Mortar
- C 150 Specification for Portland Cement
- C 270 Specification for Mortar for Unit Masonry
- C 404 Specification for Aggregates for Masonry Grout
- C 476 Specification for Grout for Masonry

Brick Institute of America (BIA)

Technical Notes on Brick Construction

- 8 REV Portland Cement—Lime Mortars for Brick Masonry
- 8A Standard Specification for Portland Cement—Lime Mortar for Brick Masonry
- 8B Mortar for Brick Masonry Selection and Controls
- 11E Guide Specifications for Brick Masonry, Part V

National Concrete Masonry Association (NCMA)

TEK Bulletins

- 20 Mortars for Concrete Masonry
- 23A Grouting for Concrete Masonry Walls
- 71 Cold Weather Construction with Masonry Construction
- 85 Building Weathertight Concrete Masonry Walls

Portland Cement Association (PCA)

- IS041M Building Weathertight Concrete Masonry Walls

EB008M Concrete Masonry Handbook
IS040M Mortars for Masonry Walls

International Masonry Industry All-Weather Council (IMIAC)
Recommended Practices and Guide Specifications for Cold Weather Masonry Construction

Concrete Unit Masonry

American National Standards Institute (ANSI)

A41.1 Building Code Requirements for Masonry
A41.2 Building Code Requirements for Reinforced Masonry

American Society for Testing and Materials (ASTM)

C 55 Specification for Concrete Building Brick
C 90 Specification for Hollow Load-Bearing Concrete Masonry Units
C 129 Specification for Non-Load-Bearing Concrete Masonry Units
C 145 Specification for Solid Load-Bearing Concrete Masonry Units
C 270 Specification for Mortar for Unit Masonry
C 476 Specification for Grout for Masonry
C 744 (R1985) Specification for Prefaced Concrete and Calcium Silicate Masonry Units

American Concrete Institute (ACI)

530 Proposed Building Code Requirements for Masonry Structures
530.1 Proposed Specifications for Masonry Structures
531 Building Code Requirements for Concrete Masonry Structures
531.1 Specification for Concrete Masonry Construction

National Concrete Masonry Association (NCMA)

TR 68A Design and Construction of Plain and Reinforced Concrete Masonry Basement and Foundation Walls
TR 75B Specification for the Design and Construction of Load-Bearing Concrete Masonry
TR 83 Nonreinforced Concrete Masonry Design Tables
TR 84 Reinforced Concrete Masonry Design Tables
TR 90 Architectural & Engineering Concrete Masonry Details for Building Construction
TR 93 Design Tables for Reinforced Concrete Masonry Lintels for Concrete Masonry Structures
TR 95 ASTM Specifications for Concrete Masonry Units
TR 96 Building Code Requirements for Concrete Masonry Structures
TEK 2A Sizes and Shapes of Concrete Masonry Units
TEK 3 Control of Wall Movement with Concrete Masonry
TEK 11A Reinforced Concrete Masonry—An Established Structural System
TEK 20A Mortars for Concrete Masonry
TEK 23A Grouting for Concrete Masonry Walls
TEK 36A ASTM Specifications for Concrete Masonry Units
TEK 49 Concrete Masonry Sizes, Shapes, Forms, and Functions
TEK 53 Design of Concrete Masonry for Crack Control
TEK 59 Reinforced Concrete Masonry Construction
TEK 60 HUD-FHA Requirements for Concrete Masonry Construction
TEK 108 Testing Concrete Masonry Assemblages

Portland Cement Association (PCA)

- IS041M Building Weathertight Concrete Masonry Walls
- EB008M Concrete Masonry Handbook
- IS040M Mortars for Masonry Walls
- LT107M Recommended Practices and Guide Specifications for Cold-Weather Masonry Construction
- PA043M Recommended Practices for Laying Concrete Block

International Masonry Industry All-Weather Council (IMIAC)

Recommended Practices and Guide Specification for Cold-Weather Masonry Construction

Waterproofing, Vapor Retarders

American Concrete Institute (ACI)

- 515.1R Guide to Use of Waterproofing, Dampproofing, Protective, and Decorative Barrier Systems for Concrete

American Society for Testing and Materials (ASTM)

- C 755 Practice for Selection of Vapor Retarders for Thermal Insulation
- C 981 Guide for Design of Built-Up Bituminous Membrane Waterproofing Systems for Building Decks

National Concrete Masonry Association (NCMA)

- 55 Waterproof Coatings for Concrete Masonry

National Roofing Contractors Association (NRCA)

The NRCA Waterproofing Manual

Sealant & Waterproofers Institute (SWI)

Sealant and Caulking Guide Specification

Joint Sealers

Fillers & Gaskets

American Society for Testing and Materials (ASTM)

- C 542 Specification for Lock-Strip Gaskets
- D 994 Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
- D 1056 Specification for Flexible Cellular Materials—Sponge or Expanded Rubber
- D 1565 Specification for Flexible Cellular Materials—Vinyl Chloride Polymers and Copolymers (Open-Cell Foam)
- D 1667 Specification for Flexible Cellular Materials—Vinyl Chloride Polymers and Copolymers (Closed-Cell Vinyl)
- D 1751 Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
- D 1752 Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
- D 2628 Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements

- D 4070 Specification for Adhesive Lubricant for Installation of Preformed Elastomeric Bridge Compression Seals in Concrete Structures

Sealants/Caulking

American Society for Testing and Materials (ASTM)

- C 790 Practices for Use of Latex Sealing Compounds
C 804 Practices for Use of Solvent-Release Type Sealants
C 834 Specification for Latex Sealing Compounds
C 920 Specification for Elastomeric Joint Sealants
C 962 Guide for Use of Elastomeric Joint Sealants
E 814 Method of Fire Tests of Through-Penetration Fire Stops

American Concrete Institute (ACI)

- 504R Guide to Joint Sealants for Concrete Structures

Sealant & Waterproofers Institute (SWI)

Sealant and Caulking Guide Specification

A-4. STRUCTURAL FRAME

Concrete Superstructure.

General

American Concrete Institute (ACI)

- 117 Standard Tolerances for Concrete Construction and Materials
211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
301 Specifications for Structural Concrete for Buildings
302.1R Guide for Concrete Floor and Slab Construction
303R Guide to Cast-in-Place Architectural Concrete
308 Standard Practice for Curing Concrete.
304R Guide for Measuring, Mixing, Transporting, and Placing Concrete
304.3R Heavyweight Concrete: Measuring, Mixing, Transporting, and Placing
305R Hot Weather Concreting
306R Cold Weather Concreting
318 Building Code Requirements for Reinforced Concrete
523.1R Guide for Cast-In-Place Low-Density Concrete
544.3R Guide for Specifying, Mixing, Placing, and Finishing Steel Fiber Reinforced Concrete

Concrete Formwork

Occupational Safety and Health Administration (OSHA)

Subpart Q Concrete, Concrete Forms, and Shoring

International Conference of Building Officials (ICBO)

Section 2606 Formwork, Embedded Pipes, and Construction Joints

American Concrete Institute (ACI)

347 Recommended Practice for Concrete Formwork

American Plywood Association (APA)

V345 Concrete Forming

National Forest Products Association (NFOPA)

No. 3 Design of Wood Formwork for Concrete Structures

Western Wood Products Association (WWPA)

Catalog J Concrete Forms

Concrete Reinforcing

American Concrete Institute (ACI)

315-80 Details and Detailing of Concrete Reinforcement

SP-66 ACI Detailing Manual

American Welding Society (AWS)

D1.4 Structural Welding Code for Reinforcing Steel

D12.1 Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete Construction

Concrete Reinforcing Steel Institute (CRSI)

Manual of Standard Practice

63 Recommended Practice for Placing Reinforcing Bars

64 Recommended Practice for Placing Bar Supports, Specifications and Nomenclature

Concrete Curing

American Society for Testing and Materials (ASTM)

C 171 Sheet Materials for Curing Concrete

C 309 Liquid Membrane-Forming Compounds for Curing Concrete

D 2103 Polyethylene Film and Sheeting

In addition to the above, incorporate the following as applicable to alternative types of concrete construction.

Shotcrete

American Concrete Institute (ACI)

506R Guide to Shotcrete

506.2 Specification for Materials, Proportioning, and Application of Shotcrete

SP-14 Shotcreting

SP-14A Engineering Properties of Shotcrete

SP-54 Shotcrete for Ground Support

C-6 Application and Use of Shotcrete

Post-Tensioned Structural Concrete

American Society for Testing and Materials (ASTM)

- A 421 Uncoated Stress-Relieved Steel Wire for Prestressed Concrete
- A 722 Uncoated High-Strength Steel Bar for Prestressing Concrete
- A 416 Uncoated Seven-Wire Stress-Relieved Strand for Prestressed Concrete

Concrete Reinforcing Steel Institute (CRSI)

Manual of Standard Practice

- 63 Recommended Practice for Placing Reinforcing Bars
- 64 Recommended Practice for Placing Bar Supports, Specifications and Nomenclature

Structural Precast Concrete

American Concrete Institute (ACI)

- 512.1R Suggested Design of Joints and Connections in Precast Concrete
- 512.2R Precast Structural Concrete in Buildings
- 533.3R Fabrication, Handling and Erection of Precast Concrete Wall Panels
- 533.4R Design of Precast Concrete Wall Panels
- M-8 Precast Concrete: Handling and Erection

American Welding Society (AWS)

- D1.1 Structural Welding Code—Steel (ANSI/AWS D1.1)
- D1.4 Structural Welding Code—Reinforcing Steel (ANSI/AWS D1.4)

Prestressed Concrete Institute (PCI)

- JR-195 Precast Prestressed Concrete Industry Code of Standard Practice for Precast Concrete
- MNL-116 Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products
- MNL-120 PCI Design Handbook—Precast and Prestressed Concrete
- MNL-123 PCI Manual on Design of Connections for Precast Prestressed Concrete
- MNL-124 PCI Design for Fire Resistance of Precast Prestressed Concrete
- MNL-125 Plant Cast Precast and Prestressed Concrete—A Design Guide
- MNL-126 Manual for the Design of Hollow Core Slabs
- SPC-118 Guide Specification for Precast Prestressed Concrete for Buildings

Tilt-Up Precast Concrete

American Society for Testing and Materials (ASTM)

- 325 Specification for High-Strength Bolts for Structural Steel Joints

American Welding Society, Inc. (AWS)

- D1.1 Structural Welding Code—Steel
- D1.3 Structural Welding Code—Sheet Steel
- D1.4 Structural Welding Code—Reinforcing Steel

Concrete Reinforcing Steel Institute (CRSI)

Design Handbook Manual of Standard Practice

Portland Cement Association (PCA)

CR053B Special Considerations for the Selection of Tilt-Up Concrete Sandwich Panels
PA133B Tilt-Up Concrete Buildings—A Value Decision
PA079B Tilt-Up Concrete Walls
SR233B Tilt-Up Construction
EB074D Tilt-Up Load-Bearing Walls

Prestressed Concrete Institute (PCI)

Manual for Structural Design of Architectural Precast Concrete
MNL 116 Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products
MNL 120 Design Handbook—Precast and Prestressed Concrete
MNL 123 Manual on Design of Connections for Precast Prestressed Concrete

Masonry Superstructure

General

International Masonry Industry All-Weather Council (IMIAC)

Recommended Practices and Guide Specifications for Cold Weather Masonry Construction

Mortar

American Society for Testing and Materials (ASTM)

C 91 Specification for Masonry Cement (ANSI/ASTM C91)
C 144 Specification for Aggregate for Masonry Mortar
C 150 Specification for Portland Cement
C 270 Specification for Mortar for Unit Masonry
C 404 Specification for Aggregates for Masonry Grout
C 476 Specification for Grout for Masonry

Brick Institute of America (BIA)

Technical Notes on Brick Construction

8 Portland Cement—Lime Mortars for Brick Masonry
8A Standard Specification for Portland Cement—Lime Mortar for Brick Masonry
8B Mortar for Brick Masonry Selection and Controls
11E Guide Specifications for Brick Masonry, Part V

National Concrete Masonry Association (NCMA)

TEK Bulletins

20 Mortars for Concrete Masonry
23A Grouting for Concrete Masonry Walls
71 Cold Weather Construction with Masonry Construction
85 Building Weathertight Concrete Masonry Walls

Portland Cement Association (PCA)

IS041M Building Weathertight Concrete Masonry Walls
EB009M Concrete Masonry Handbook
IS040M Mortars for Masonry Walls

In addition to the above, incorporate the following as applicable to alternative types of masonry construction.

Brick Unit Masonry

American Society for Testing and Materials (ASTM)

- C 62 Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)
- C 216 Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)
- C 652 Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)

Brick Institute of America (BIA)

- Brick and Tile Engineering
- Building Code Requirements for Engineered Brick Masonry
- Recommended Practice for Engineered Brick Masonry
- Recommended Practices and Guide Specifications for Cold Weather Masonry Construction
- Technical Notes on Brick Construction

Masonry Institute of America (MIA)

- Reinforced Grouted Brick Masonry
- Reinforced Masonry Engineering Handbook
- Reinforced Steel in Masonry

Concrete Unit Masonry

American National Standards Institute (ANSI)

- A41.1 Building Code Requirements for Masonry
- A41.2 Building Code Requirements for Reinforced Masonry

American Society for Testing and Materials (ASTM)

- C 55 Specification for Concrete Building Brick
- C 90 Specification for Hollow Load-Bearing Concrete Masonry Units
- C 129 Specification for Non-Load-Bearing Concrete Masonry Units
- C 145 Specification for Solid Load-Bearing Concrete Masonry Units
- C 744 Specification for Prefaced Concrete and Calcium Silicate Masonry Units

American Concrete Institute (ACI)

- 530 Proposed Building Code Requirements for Masonry Structures
- 530.1 Proposed Specifications for Masonry Structures
- 531 Building Code Requirements for Concrete Masonry Structures
- 531.1 Specification for Concrete Masonry Construction

National Concrete Masonry Association (NCMA)

- TR 68A Design and Construction of Plain and Reinforced Concrete Masonry Basement and Foundation Walls
- TR 75B Specification for the Design and Construction of Load-Bearing Concrete Masonry
- TR 83 Nonreinforced Concrete Masonry Design Tables
- TR 84 Reinforced Concrete Masonry Design Tables
- TR 90 Architectural & Engineering Concrete Masonry Details for Building Construction
- TR 93 Design Tables for Reinforced Concrete Masonry Lintels for Concrete Masonry Structures
- TR 95 ASTM Specifications for Concrete Masonry Units

- TR 96 Building Code Requirements for Concrete Masonry Structures
- TEK 2A Sizes and Shapes of Concrete Masonry Units
- TEK 3 Control of Wall Movement with Concrete Masonry
- TEK 11A Reinforced Concrete Masonry—An Established Structural System
- TEK 20A Mortars for Concrete Masonry
- TEK 23A Grouting for Concrete Masonry Walls
- TEK 36A ASTM Specifications for Concrete Masonry Units
- TEK 49 Concrete Masonry Sizes, Shapes, Forms, and Functions
- TEK 53 Design of Concrete Masonry for Crack Control
- TEK 59 Reinforced Concrete Masonry Construction
- TEK 60 HUD-FHA Requirements for Concrete Masonry Construction
- TEK 108 Testing Concrete Masonry Assemblages

Portland Cement Association (PCA)

- IS041M Building Weathertight Concrete Masonry Walls
- EB008M Concrete Masonry Handbook
- IS040M Mortars for Masonry Walls
- LT107M Recommended Practices and Guide Specifications for Cold-Weather Masonry Construction
- PA043M Recommended Practices for Laying Concrete Block
- IMIAC International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Cold-Weather Masonry Construction

Shop Fabricated Masonry Panels

American Society for Testing and Materials (ASTM)

- A 36 Structural Steel
- C 216 Facing Brick (Solid Masonry Units Made From Clay or Shale)
- C 652 Hollow Brick (Hollow Masonry Units Made From Clay or Shale)

American Welding Society (AWS)

- D1.1 Structural Welding Code

Structural Steel Superstructure

General

American Institute of Steel Construction (AISC)

- M011 Manual of Steel Construction

American National Standards Institute (ANSI)

- A10.3 Powder-Actuated Fastening Systems—Safety Requirements

American Welding Society, Inc. (AWS)

- A2.0 Standard Welding Symbols
- D1.1 Structural Welding Code—Steel

Steel Structures Painting Council (SSPC)

Steel Structures Painting Manual:

Vol 1—Good Painting Practice

Vol 2—Systems and Specifications

Structural Steel

American Society for Testing and Materials (ASTM)

A 36 Specification for Structural Steel

A 53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

A 307 Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

A 325 Specification for High-Strength Bolts for Structural Steel Joints

American Institute of Steel Construction (AISC)

S326 Specification for Design, Fabrication and Erection of Structural Steel for Buildings

S329 Specification for Structural Joints Using ASTM A325 or A490 Bolts

S323 Quality Criteria and Inspection Standards

American Institute for Steel Construction (AISC)

Specification for the Design, Fabrication and Erection of Structural Steel for Buildings

Specification for Architectural Exposed Structural Steel

Steel Joists

American Society for Testing and Materials (ASTM)

A 36 Specification for Structural Steel

A 307 Specification for Carbon Steel Externally Threaded Standard Fasteners

A 325 Specification for High-Strength Bolts for Structural Steel Joints

American Institute of Steel Construction (AISC)

Specifications and Load Tables for Open Web Steel Joists, Longspan Steel Joists, Deep Longspan Steel Joists.

American Iron and Steel Institute (AISI)

Cold Formed Steel Design Manual

80 Specification for the Design of Cold-Formed Steel Structural Members

Steel Joist Institute (SJI)

Standard Specifications, Load Tables & Weight Tables for Steel Joists & Joist Girders

Technical Digest No. 2 Spacing of Bridging

Technical Digest No. 3 Structural Design of Steel Joist Roofs to Resist Ponding Loads

Technical Digest No. 4 Design of Fire-Resistive Assemblies

Technical Digest No. 8 Welding of Open Web Steel Joists

Steel Deck

American Society for Testing and Materials (ASTM)

A 446 Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality

A 463 Specification for Steel Sheet, Cold-Rolled, Aluminum-Coated Type 1 and Type 2

- A 525 Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
- A 780 Practice for Repair of Damaged Hot-Dip Galvanized Coatings
- A 936 Practice for Roof System Assemblies Employing Steel Deck, Preformed Roof Insulation, and Bituminous Build-Up Roofing

American Welding Society, Inc. (AWS)

D1.3 Structural Welding Code—Sheet Steel

National Roofing Contractors Association (NRCA)

The NRCA Built-Up Roofing Manual: 1.7. Steel Roof Decks

Steel Deck Institute (SDI)

Diaphragm Design Manual

25 Design Manual for Composite Decks, Form Decks, and Roof Decks

Pre-Engineered Building Systems

American Society for Testing and Materials (ASTM)

- A 36 Specification for Structural Steel.
- A 325 Specification for High-Strength Bolts for Structural Steel Joints.
- A 500 Specification for Cold-Folded Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- A 501 Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- A 525 Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- C 665 Specification for Mineral-Fiber blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

American Institute of Steel Construction (AISC)

S326 Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings

American Iron and Steel Institute (AISI)

SG 503 The Design and Fabrication of Cold-Formed Steel Structures

Metal Building Manufacturers Association, Inc (MBMA)

Code of Standard Practice

Guide for Selection of Metal Building Systems

Low Rise Building System Manual

Cold-Formed Metal Framing Superstructure

American Society for Testing and Materials (ASTM)

- A 446 Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
- C 955 Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Track), and Bracing or Bridging for Screw Application of Gypsum Board and Metal Plaster Bases

American Iron and Steel Institute (AISI)

Specification for the Design of Cold-Formed Steel Structural Members

American Welding Society, Inc. (AWS)

D1.3 Structural Welding Code—Sheet Steel

Brick Institute of America (BIA)

28B Brick Veneer—Panel and Curtain Walls

Metal Lath/Steel Framing Association (ML/SFA)

Light Gage Steel Framing Fabrication Guide

Light Gage Steel Framing Specifications

Lightweight Steel Framing Systems Manual

Physical Property Selection Charts

Technical Information File

American Society for Testing and Materials (ASTM)

A 123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A 525 Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

Association of Wall and Ceiling Industries (AWCI)

Specifications Guide for Cold-Formed Steel Structural Members

Metal Framing Manufacturers Association (MFMA)

Guidelines for the Use of Metal Framing

Structural Aluminum Superstructures

Aluminum Association, Inc. (AA)

SAS-30 Specifications for Aluminum Structures

SDA-38 Structural Design with Aluminum

Metal Fabrications

American Welding Society, Inc. (AWS)

D1.1 Structural Welding Code—Steel

D1.2 Structural Welding Code—Aluminum

National Association of Architectural Metal Manufacturers (NAAMM)

Metal Bar Grating Manual

Metal Finishes Manual

Pipe Railing Manual

Metal Stairs

National Association of Architectural Metal Manufacturers (NAAMM)

Metal Stairs Manual

Steel Structures Painting Council (SSPC)

Steel Structures Painting Manual:

Vol 1—Good Painting Practice

Vol 2—Systems and Specifications

Grating and Floor Plates

American National Standards Institute (ANSI)

MBG 531 Metal Bar Grating Manual

MBG 532 Heavy Duty Metal Bar Grating Manual

Building Expansion Joint Covers

American Society for Testing and Materials (ASTM)

ASTM B221 Aluminum-Alloy, Extruded Bar, Rod, Wire, Shape, and Tube

ASTM B308 Aluminum-Alloy, Standard Structural Shapes, Rolled or Extruded

ASTM B445 Copper-Zinc-Lead Alloy (Leaded-Brass) Extruded Shapes

Fireproofing

American Society for Testing and Materials (ASTM)

E 84 Test Method for Surface Burning Characteristics of Building Materials

E 119 Methods of Fire Tests of Building Construction and Materials

E 605 Test Methods for Thickness and Density of Sprayed Fire-Resistive Material Applied to Structural Members

E 736 Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

E 760 Test Method for the Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members

E 814 Method of Fire Tests of Through-Penetration Fire Stops

American Iron and Steel Institute (AISI)

Designing Fire Protection for Steel Columns

Designing Fire Protection for Steel Trusses

Fire Resistant Steel Frame Construction

Fire Safe Structural Steel, A Design Guide

Factory Mutual Engineering & Research Corporation (FM)

Approval Guide to Equipment, Materials & Services, Building Materials & Construction:

Fire Protective Coatings

Wall & Floor Penetration Fire Stops

National Fire Protection Association (NFPA)

703 Fire Retardant Impregnated Wood and Fire Retardant Coatings for Building Materials:

Fire Protection Handbook

Underwriters Laboratories, Inc. (UL)

1709 Structural Steel Protected for Resistance to Rapid-Temperature-Rises Fires

Fire Resistance Directory

Gypsum Association (GA)
Fire Resistance Design Manual

Joint Sealers

Fillers & Gaskets

American Society for Testing and Materials (ASTM)

- C 542 Specification for Lock-Strip Gaskets
- D 994 Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
- D 1056 Specification for Flexible Cellular Materials—Sponge or Expanded Rubber
- D 1565 Specification for Flexible Cellular Materials—Vinyl Chloride Polymers and Copolymers (Open-Cell Foam)
- D 1667 Specification for Flexible Cellular Materials—Vinyl Chloride Polymers and Copolymers (Closed-Cell Vinyl)
- D 1751 Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
- D 1752 Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
- D 2628 Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
- D 4070 Specification for Adhesive Lubricant for Installation of Preformed Elastomeric Bridge Compression Seals in Concrete Structures

Sealants/Caulking

American Society for Testing and Materials (ASTM)

- C 790 Practices for Use of Latex Sealing Compounds
- C 804 Practices for Use of Solvent-Release Type Sealants
- C 834 Specification for Latex Sealing Compounds
- C 919 Practice for Use of Sealants in Acoustical Applications
- C 920 Specification for Elastomeric Joint Sealants
- C 962 Guide for Use of Elastomeric Joint Sealants
- E 814 Method of Fire Tests of Through-Penetration Fire Stops

American Concrete Institute (ACI)

- 504R Guide to Joint Sealants for Concrete Structures

Sealant & Waterproofers Institute (SWI)

- Sealant and Caulking Guide Specification

A-5. ROOF CONSTRUCTION

General

National Roofing Contractors Association (NRCA)

- The NRCA Steep Roofing Manual
- The NRCA Low-Slope Roofing Manual
- The NRCA Built-Up Roofing Manual
- The NRCA Construction Details
- Handbook of Accepted Roofing Knowledge
- Roofing and Waterproofing Manual

NCRA Roofing Materials Reference and Guide

National Fire Protection Association (NFPA)

203M Manual on Roof Coverings and Roof Deck Constructions

Underwriters Laboratories, Inc. (UL)

997 Wind Resistance of Prepared Roof Covering Materials

Vapor Retarders

American Society for Testing and Materials (ASTM)

C 755-85 Practice for Selection of Vapor Retarders for Thermal Insulation

International Conference of Building Officials (ICBO)

Section 1713 Insulation

Sealant and Waterproofer's Institute (SWI)

Sealant and Caulking Guide Specifications

Insulation

American Society for Testing and Materials (ASTM)

- C 208 Specification for Insulating Board (Cellulosic Fiber) Structural and Decorative
- C 552 Specification for Cellular Glass Thermal Insulation
- C 578 Specification for Preformed, Cellular Polystyrene Thermal Insulation
- C 591 Specification for Unfaced Preformed Rigid Cellular Polyurethane Thermal Insulation
- C 612 Specification for Mineral Fiber Block and Board Thermal Insulation
- C 726 Specification for Mineral Fiber and Mineral Fiber, Rigid Cellular Polyurethane Composite Roof Insulation Board
- C 728 Specification for Perlite Thermal Insulation Board
- D 2341 Specification for Rigid Urethane Foam

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

ASAHRAE Handbook of Fundamentals. Chapter 23, Design Heat Transmission Coefficients

National Roofing Contractors Association (NRCA)

Roof Insulation

Fireproofing

American National Standards Institute (ANSI)

- 634 Cable Penetration Fire Stop Qualification Test

American Society for Testing and Materials (ASTM)

- E 84 Test Method for Surface Burning Characteristics of Building Materials
- E 108 Methods of Fire Tests of Roof Coverings
- E 119 Methods of Fire Tests of Building Construction and Materials
- E 814 Method of Fire Tests of Through-Penetration Fire Stops

Factory Mutual Engineering & Research Corp. (FM)

Approval Guide to Equipment, Materials & Services, Building Materials & Construction:
Fire Protective Coatings
Wall & Floor Penetration Fire Stops

National Fire Protection Association (NFPA)

703 Fire Retardant Impregnated Wood and Fire Retardant Coatings for Building Materials
Fire Protection Handbook

Underwriters Laboratories, Inc. (UL)

1709 Structural Steel Protected for Resistance to Rapid-Temperature-Rises Fires
Fire Resistance Directory

Gypsum Association (GA)

Fire Resistance Design Manual

Roof Coverings

In addition to the above, incorporate the following as applicable to alternative types of roof construction.

Shingles

American Society for Testing and Materials (ASTM)

C 406 Specification for Roofing Slate
D 225 Specification for Asphalt Shingles (Organic Felt) Surfaced with Mineral Granules
D 226 Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
D 2822 Specification for Asphalt Roof Cement
D 3018 Specification for Class A Asphalt Shingles Surfaced with Mineral Granules
D 3462 Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules

Asphalt Roofing Manufacturers Association (ARMA)

Residential Asphalt Roofing Manual

Elastomeric/Plastomeric Sheet Roofing

American Society For Testing and Materials (ASTM)

D 3105 Index of Methods for Testing Elastomeric and Plastomeric Roofing and Waterproofing Materials

Midwest Roofing Contractors Association (MRCA)

Recommended Performance Criteria for Elastomeric Single-Ply Roof Membrane Systems
Recommended Performance Criteria for PVC Single-Ply Roof Membrane Systems

Roofing Industry Educational Institute (RIEI)

Roofing System Specifications for Sheet-Applied Elastomeric, Thermoplastic and Modified Bituminous Membrane Systems

Single-Ply Roofing Institute (SPRI)

Wind Design Guide for Ballasted Single-Ply Roofing Systems
Single-Ply Roofing: A Professional's Guide to Specifications

Modified Bitumin Roofing

Factory Mutual Engineering & Research Corp (FM)
4470 Class I Roof Covers

Midwest Roofing Contractors Association (MRCA)
Recommended Performance Criteria for Modified Bitumen Roof Membrane Systems (November 1983)

National Roofing Contractors Association (NRCA)
Quality Control Recommendations for Polymer Modified Bitumen Roofing

Single-Ply Roofing Institute (SRPI)
Single-Ply Roofing: A Professional's Guide to Specifications

Coated Foam Roofing

The Society of the Plastics Industry, Inc. (SPI)
Design Consideration of Sprayed Polyurethane Foam Insulation Systems for Remedial Roofing
The Application of Sprayed Urethane Foam Insulation Systems for New Roofing

Protected Membrane Roofing

Underwriters Laboratories, Inc. (UL)
Building Materials Directory
TEVT Roof Covering Materials
TFWZ Prepared Roof Covering Materials
TGFU Roofing Systems

Metal Roofing

Aluminum Association, Inc. (AA)
ASM-35 Specifications for Sheet Metal Work

Architectural Aluminum Manufacturers Association (AAMA)
AAMA 605 Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels

American Hot Dip Galvanizers Association, Inc. (AHDGA)
Specification Guide for Hot Dip Galvanizing
The Design of Products to be Hot Dip Galvanized after Fabrication
Inspection of Products Hot Dip Galvanized after Fabrication

American Iron and Steel Institute (AISI)
Stainless Steel—Suggested Practices for Roofing, Flashing, Copings, Fascias, Gravel Stops, Drainage
Stainless Steel Uses in Architecture

American Welding Society, Inc. (AWS)
Soldering Manual

National Association of Architectural Metal Manufacturers (NAAMM)
Metal Finishes Manual

Sheet Metal & Air Conditioning Contractors National Association, Inc. (SMACNA)
Architectural Sheet Metal Manual
Architectural Sheet Metal Specifications

American Society for Testing and Materials (ASTM)
A 167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
A 308 Specification for Steel Sheet, Cold-Rolled, Long Terne Coated
A 525 Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
B 209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate
B 370 Specification for Copper Sheet and Strip for Building Construction

Factory Mutual Engineering & Research Corp. (FM)
1-49 Perimeter Flashing

The Aluminum Association, Inc. (AA)
35 Specifications for Aluminum Sheet Metal Work in Building Construction

American Iron and Steel Institute (AISI)
Stainless Steel Suggested Practices for Roofing, Flashing, Copings, Fascias, Gravel Stops, and Drainage

Steel Structures Painting Council (SSPC)
Steel Structures Painting Manual
Vol 1 Good Painting Practice
Vol 2 Systems and Specifications

Traffic Topping

Occupational Safety and Health Administration (OSHA)
29 CFR 1910 Safety and Health Standards Subpart D: Walking—Working Surfaces

Prefabricated Roof Specialties

Aluminum Association, Inc. (AA)
Specifications for Aluminum Sheet Metal Work in Building Construction
Aluminum Standards and Data

American Iron and Steel Institute (AISI)
Cold-Formed Steel Design Manual
Design Guidelines for the Selection and Use of Stainless Steel

National Association of Architectural Metal Manufacturers (NAAMM)
Metal Finishes Manual

Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA)
Architectural Sheet Metal Manual
Architectural Sheet Metal Specifications

Roof Accessories

National Fire Protection Association (NFPA)
240M Guide for Smoke and Heat Venting

Underwriters Laboratories, Inc. (UL)
Building Materials Directory
(ZAQR) Vents, Smoke and Heat
(ZBDZ) Roof Vents, Automatically Operated

Sheet Metal & Air Conditioning Contractors' Nat'l Assoc. (SMACNA)
Architectural Sheet Metal Manual
Architectural Sheet Metal Specifications

Skylights

American Society for Testing and Materials (ASTM)
E 283 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors
E 330 Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
E 547 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential
E 783 Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
E 1105 Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference

American Architectural Manufacturer's Association (AAMA)
1601.1-76 Voluntary Thickness Specifications for Acrylic Plastic Skylight Domes
1605.1 Voluntary Standard Uniform Load Test Procedure for Thermoformed Plastic Domed Skylights
1606-82 Voluntary Uniform Load Structural Standard for Plastic Domed Skylights
TIR-A7 Slope Glazing Guidelines

Aluminum Association, Inc. (AA)
Standards for Anodized Architectural Aluminum (SAA-38)

National Association of Architectural Metal Manufacturers (NAAMM)
Metal Finishes Manual

Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA)
Architectural Sheet Metal Manual

Plate 97	Formed Skylights
Plate 98	Plastic Skylights
Plate 99	Plastic Skylights
Plate 100	Extruded Skylights

Architectural Sheet Metal Specifications

Section 33J	Flashings—Skylight
Section 48	Skylights

Joint Sealers

Fillers & Gaskets

American Society for Testing and Materials (ASTM)

C 542	Specification for Lock-Strip Gaskets
D 994	Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
D 1056	Specification for Flexible Cellular Materials—Sponge or Expanded Rubber
D 1565	Specification for Flexible Cellular Materials—Vinyl Chloride Polymers and Copolymers (Open-Cell Foam)
D 1667	Specification for Flexible Cellular Materials—Vinyl Chloride Polymers and Copolymers (Closed-Cell Vinyl)
D 1751	Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
D 1752	Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
D 2628	Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
D 4070	Specification for Adhesive Lubricant for Installation of Preformed Elastomeric Bridge Compression Seals in Concrete Structures

Sealants/Caulking

American Society for Testing and Materials (ASTM)

C 790	Practices for Use of Latex Sealing Compounds
C 804	Practices for Use of Solvent-Release Type Sealants
C 834	Specification for Latex Sealing Compounds
C 919	Practice for Use of Sealants in Acoustical Applications
C 920	Specification for Elastomeric Joint Sealants
C 962	Guide for Use of Elastomeric Joint Sealants
E 814	Method of Fire Tests of Through-Penetration Fire Stops

A-6. EXTERIOR CLOSURE

General

National Fire Protection Association (NFPA)

80A Exterior Fire Exposures

Exterior Wall

General

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)
Handbook of Fundamentals: Chapter 20, Thermal Insulation and Vapor Retarders

Masonry Wall Construction

General

International Masonry Industry All-Weather Council (IMIAC)
Recommended Practices and Guide Specifications for Cold-Weather Masonry Construction

Mortar

American Society for Testing and Materials (ASTM)

- C 91 Specification for Masonry Cement
- C 144 Specification for Aggregate for Masonry Mortar
- C 150 Specification for Portland Cement
- C 270 Specification for Mortar for Unit Masonry
- C 404 Specification for Aggregates for Masonry Grout
- C 476 Specification for Grout for Masonry

Brick Institute of America (BIA)

Technical Notes on Brick Construction

- 8 REV Portland Cement—Lime Mortars for Brick Masonry
- 8A Standard Specification for Portland Cement—Lime Mortar for Brick Masonry
- 8B Mortar for Brick Masonry Selection and Controls
- 11E Guide Specifications for Brick Masonry, Part V

National Concrete Masonry Association (NCMA)

- TEK Bulletins
- 20 Mortars for Concrete Masonry
- 23A Grouting for Concrete Masonry Walls
- 71 Cold Weather Construction with Masonry Construction
- 85 Building Weathertight Concrete Masonry Walls

Portland Cement Association (PCA)

- IS041M Building Weathertight Concrete Masonry Walls
- EB008M Concrete Masonry Handbook
- IS040M Mortars for Masonry Walls

Concrete Unit Masonry

American National Standards Institute (ANSI)

- A41.1 Building Code Requirements for Masonry
- A41.2 Building Code Requirements for Reinforced Masonry

American Society for Testing and Materials (ASTM)

- C 55 Specification for Concrete Building Brick

- C 90 Specification for Hollow Load-Bearing Concrete Masonry Units
- C 129 Specification for Non-Load-Bearing Concrete Masonry Units
- C 145 Specification for Solid Load-Bearing Concrete Masonry Units
- C 744 Specification for Prefaced Concrete and Calcium Silicate Masonry Units

American Concrete Institute (ACI)

- 530 Proposed Building Code Requirements for Masonry Structures
- 530.1 Proposed Specifications for Masonry Structures
- 531 Building Code Requirements for Concrete Masonry Structures
- 531.1 Specification for Concrete Masonry Construction

National Concrete Masonry Association (NCMA)

- TR 68A Design and Construction of Plain and Reinforced Concrete Masonry Basement and Foundation Walls
- TR 75B Specification for the Design and Construction of Load-Bearing Concrete Masonry
- TR 83 Nonreinforced Concrete Masonry Design Tables
- TR 84 Reinforced Concrete Masonry Design Tables
- TR 90 Architectural & Engineering Concrete Masonry Details for Building Construction
- TR 93 Design Tables for Reinforced Concrete Masonry Lintels for Concrete Masonry Structures
- TR 95 ASTM Specifications for Concrete Masonry Units
- TR 96 Building Code Requirements for Concrete Masonry Structures
- TEK 2A Sizes and Shapes of Concrete Masonry Units
- TEK 3 Control of Wall Movement with Concrete Masonry
- TEK 11A Reinforced Concrete Masonry—An Established Structural System
- TEK 20A Mortars for Concrete Masonry
- TEK 23A Grouting for Concrete Masonry Walls
- TEK 36A ASTM Specifications for Concrete Masonry Units
- TEK 49 Concrete Masonry Sizes, Shapes, Forms, and Functions
- TEK 53 Design of Concrete Masonry for Crack Control
- TEK 59 Reinforced Concrete Masonry Construction
- TEK 60 HUD-FHA Requirements for Concrete Masonry Construction
- TEK 108 Testing Concrete Masonry Assemblages

Portland Cement Association (PCA)

- IS041M Building Weathertight Concrete Masonry Walls
- EB008M Concrete Masonry Handbook
- IS040M Mortars for Masonry Walls
- LT107M Recommended Practices and Guide Specifications for Cold-Weather Masonry Construction
- PA043M Recommended Practices for Laying Concrete Block

Cold-Formed Metal Framing Wall Construction

American Society for Testing and Materials (ASTM)

- A 123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- A 446 Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
- A 525 Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

- C 79 Specification for Gypsum Sheathing Board
- C 955 Specification for Load-Bearing (transverse and Axial) Steel Studs, Runners (Track), and Bracing or Bridging for Screw Application of Gypsum Board and Metal Plaster Bases

American Iron and Steel Institute (AISI)

Specification for the Design of Cold-Formed Steel Structural Members

American Welding Society, Inc. (AWS)

- D1.1 Structural Welding Code
- D1.3 Structural Welding Code—Sheet Steel

Brick Institute of America (BIA)

- 28B Brick Veneer—Panel and Curtain Walls

Metal Lath/Steel Framing Association (ML/SFA)

- Light Gage Steel Framing Fabrication Guide
- Light Gage Steel Framing Specifications
- Lightweight Steel Framing Systems Manual
- Physical Property Selection Charts
- Technical Information File
- Fire-Rated Metal Lath/Steel Stud Exterior Walls

Association of Wall and Ceiling Industries (AWCI)

Specifications Guide for Cold-Formed Steel Structural Members

Steel Structures Painting Council (SPCC)

Steel Structures Painting Manual

Metal Framing Manufacturers Association (MFMA) Guidelines for the Use of Metal Framing

Wood Frame Wall Construction

American Society for Testing and Materials (ASTM)

- A 307 Specification for Carbon Steel Externally Threaded Standard Fasteners
- C 79 Specification for Gypsum Sheathing Board
- D 2277 Specification for Fiberboard Nail-Base Sheathing

American Hardwood Association (AHA)

- A135.4 Basic Hardboard

American Institute of Timber Construction (AITC)

Timber Construction Manual

American Lumber Standards Committee (ALSC)

- PS 20 American Softwood Lumber Standard: Certified Agencies and Typical Grade Stamps

American National Standards Institute (ANSI)

- A208.1 Mat-Formed Wood Particleboard

American Plywood Association (APA)

J20 Grades & Specifications
Y510 Plywood Design Specification

American Wood-Preservers' Association (AWPA)

C1 All Timber Products—Preservative Treatment by Pressure Processes
C20 Structural Lumber—Fire-Retardant Treatment by Pressure Processes
C27 Plywood—Fire-Retardant Treatment by Pressure Processes

American Wood Preservers Bureau (AWPB)

LP2 LP22 Waterborne salts
LP3 LP33 Penta, light hydrocarbon solvent (Type C)
LP4 LP44 Penta, volatile hydrocarbon solvent (Type B or D)
LP5 LP55 Creosote or creosote/cal-tar solution
LP7 LP77 Penta, heavy hydrocarbon solvent (Type A)

American Wood Preservers Institute (AWPI)

Pressure Treated Wood—Design/Specifications

California Redwood Association (CRA), Redwood Inspection Service (RIS)

Standard Specifications for Grades of California Redwood Lumber

International Conference of Building Officials (ICBO)

Chapter 25 Wood
Chapter 43 Fire-Resistive Standards

National Forest Products Association (NFoPA)

National Design Specifications for Wood Construction
Wood Structural Design Data

Southern Pine Inspection Bureau (SPIB)

Grading Rules

West Coast Lumber Inspection Bureau (WCLIB)

Grading Rules

Western Wood Products Association (WWPA)

Grading Rules for Western Lumber

Waterproofing, Vapor Retarders

American Concrete Institute (ACI)

515.1R Guide to Use of Waterproofing, Dampproofing, Protective, and Decorative Barrier Systems for Concrete

American Society for Testing and Materials (ASTM)

C 755 Practice for Selection of Vapor Retarders for Thermal Insulation
C 981 Guide for Design of Built-Up Bituminous Membrane Waterproofing Systems for Building Decks

National Concrete Masonry Association (NCMA)
55 Waterproof Coatings for Concrete Masonry

National Roofing Contractors Association (NRCA)
The NRCA Waterproofing Manual

Sealant & Waterproofer Institute (SWI)
Sealant and Caulking Guide Specification

Insulation

American Society for Testing and Materials (ASTM)

- C 101 Specification for Spray-Applied Mineral Fiber Thermal or Acoustical Insulation
- C 208 Specification for Insulating Board (Cellulosic Fiber), Structural and Decorative
- C 516 Specification for Vermiculite Loose Fill Thermal Insulation
- C 534 Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
- C 549 Specification for Perlite Loose Fill Insulation
- C 552 Specification for Cellular Glass Thermal Insulation
- C 578 Specification for Preformed, Cellular Polystyrene Thermal Insulation
- C 591 Specification for Unfaced Preformed Rigid Cellular Polyurethane Thermal Insulation
- C 612 Specification for Mineral Fiber Block and Board Thermal Insulation
- C 665 Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
- C 727 Recommended Practice for Use of Reflective Insulation in Building Construction
- C 739 Specification for Cellulosic Fiber (Wood-Base) Loose-Fill Thermal Insulation
- C 755 Practice for Selection of Vapor Retarders for Thermal Insulation
- C 764 Specification for Mineral Fiber Loose-Fill Thermal Insulation
- C 846 Specification for Application of Structural Insulating Board (Fiberboard) Sheathing
- C 991 Specification for Flexible Glass Fiber Insulation for Pre-Engineered Metal Buildings
- C 1015 Practice for Installation of Cellulosic and Mineral Fiber Loose-Fill Thermal Insulation
- C 1029 Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation
- C 1049 Practice for Installation of Granular Loose-Fill Thermal Insulation

Consumer Product Safety Commission (CPSC)
16CFR1209 Interim Safety Standard for Cellulose Insulation

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
ASHRAE Handbook Fundamentals: Chapter 20 Thermal Insulation and Water Vapor Retarders

The Society of the Plastics Industry, Inc. (SPI)

- U-100R Fire Safety Guidelines for Use of Rigid Polyurethane Foam Insulation in Building Construction
- U-108 An Assessment of the Thermal Performance of Rigid Polyurethane and Polyisocyanurate Foam Insulations for Use in Building Construction

Fireproofing

American National Standards Institute (ANSI)

634 Cable Penetration Fire Stop Qualification Test

American Society for Testing and Materials (ASTM)

E 84 Test Method for Surface Burning Characteristics of Building Materials

E 119 Methods of Fire Tests of Building Construction and Materials

E 814 Method of Fire Tests of Through-Penetration Fire Stops

Factory Mutual Engineering & Research Corp. (FM)

Approval Guide to Equipment, Materials & Services, Building Materials & Construction:

Fire Protective Coatings

Wall & Floor Penetration Fire Stops

National Fire Protection Association (NFPA)

703 Fire Retardant Impregnated Wood and Fire Retardant Coatings for Building Materials

Fire Protection Handbook

Underwriters Laboratories, Inc. (UL)

1709 Structural Steel Protected for Resistance to Rapid-Temperature-Rises Fires

Fire Resistance Directory

Gypsum Association (GA)

Fire Resistance Design Manual

Joint Sealers—Fillers & Gaskets

American Society for Testing and Materials (ASTM)

C 542 Specification for Lock-Strip Gaskets

D 994 Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)

D 1056 Specification for Flexible Cellular Materials—Sponge or Expanded Rubber

D 1565 Specification for Flexible Cellular Materials—Vinyl Chloride Polymers and Copolymers (Open-Cell Foam)

D 1667 Specification for Flexible Cellular Materials—Vinyl Chloride Polymers and Copolymers (Closed-Cell Vinyl)

D 1751 Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

D 1752 Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

D 2628 Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements

D 4070 Specification for Adhesive Lubricant for Installation of Preformed Elastomeric Bridge Compression Seals in Concrete Structures

Joint Sealers—Sealants/Caulking

American Society for Testing and Materials (ASTM)

- C 790 Practices for Use of Latex Sealing Compounds
- C 804 Practices for Use of Solvent-Release Type Sealants
- C 834 Specification for Latex Sealing Compounds
- C 919 Practice for Use of Sealants in Acoustical Applications
- C 920 Specification for Elastomeric Joint Sealants
- C 962 Guide for Use of Elastomeric Joint Sealants
- E 814 Method of Fire Tests of Through-Penetration Fire Stops

American Concrete Institute (ACI)

- 504R Guide to Joint Sealants for Concrete Structures

Sealant & Waterproofers Institute (SWI)

- Sealant and Caulking Guide Specification

Soffits and Fascia

American Architectural Manufacturers Association (AAMA)

- 1402-86 Standard Specifications for Aluminum Siding, Soffit & Fascia

Exterior Finishes

Glass Fiber Reinforced Concrete

American Society for Testing and Materials (ASTM)

- A 36 Structural Steel
- A 325 High Strength Bolts for Structural Steel Joints
- A 386 Zinc Coating (Hot-Dip) on Assembled Steel Products

American Welding Society (AWS)

- D1.1 Structural Welding Code

Prestressed Concrete Institute (PCI)

- Recommended Practice for Glass Fiber Reinforced Concrete Panels
- MNL-117 Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products

Architectural Precast Concrete

American Welding Society (AWS)

- D1.1 Structural Welding Code

American Society for Testing and Materials (ASTM)

- A325 High Strength Bolts for Structural Steel Joints

Prestressed Concrete Institute (PCI)

Manual for Structural Design of Architectural Precast Concrete

MNL-117 Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products

MNL-120 Design Handbook—Precast and Prestressed Concrete

MNL-123 Manual on Design of Connections for Precast Prestressed Concrete

Brick Unit Masonry

American Society for Testing and Materials (ASTM)

C 62 Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)

C 216 Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)

C 652 Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)

Brick Institute of America (BIA)

Brick and Tile Engineering

Building Code Requirements for Engineered Brick Masonry

Recommended Practice for Engineered Brick Masonry

Recommended Practices and Guide Specifications for Cold Weather Masonry Construction

Technical Notes on Brick Construction

Brick Veneer—Panel and Curtain Walls

Masonry Institute of America (MIA)

Reinforced Grouted Brick Masonry

Reinforced Masonry Engineering Handbook

Reinforced Steel in Masonry

International Masonry Industry All-Weather Council (IMIAC)

Recommended Practices and Guide Specification for Cold Weather Masonry Construction

Stone

American Society for Testing and Materials (ASTM)

C 503 Specification for Marble Building Stone (Exterior)

C 568 Specification for Limestone Building Stone

C 615 Specification for Granite Building Stone

C 616 Specification for Sandstone Building Stone

C 629 Specification for Slate Building Stone

Indiana Limestone Institute of America (ILI)

Indiana Limestone Handbook

Marble Institute of America (MIA)

Dimensional Stone—Design Manual III

Masonry Institute of America (MIA)

Marble and Stone Slab Veneer

National Building Granite Quarries Association (NBGQA)
Specification for Architectural Granite

Shop Fabricated Masonry Panels

American Society for Testing and Materials (ASTM)

- A 36 Structural Steel
- C 216 Facing Brick (Solid Masonry Units Made From Clay or Shale)
- C 652 Hollow Brick (Hollow Masonry Units Made From Clay or Shale)

American Welding Society (AWS)

- D1.1 Structural Welding Code

Brick Institute of America (BIA)

- 28B Brick Veneer—Panel and Curtain Walls

Exterior Insulation & Finish Systems

American Society for Testing and Materials (ASTM)

- C 150 Specification for Portland Cement
- C 578 Specification for Preformed, Cellular Polystyrene Thermal Insulation

Association of the Wall and Ceiling Industries-International (AWCI)

- Recommended Practice of the Installation of Exterior Insulation and Finish Systems

Exterior Insulation Manufacturers Association (EIMA)

- 07240 EIMA Guideline Specification for Exterior Insulating and Finishing Systems
- Fire Performance Standards of Exterior Insulation and Finish Systems

Composite Building Panels

American Society for Testing and Materials (ASTM)

- B 117 Method of Salt Spray (Fog) Testing
- C 177 Steady-State Thermal Transmission Properties by Means of the Guarded Hot-Plate
- C 236 Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box
- D 968 Test Methods for Abrasion Resistance of Organic Coatings by the Falling Abrasive Tester
- D 2247 Practice for Testing Water Resistance of Coatings in 100 Percent Relative Humidity
- E 72 Methods of Conducting Strength Tests of Panels for Building Construction
- E 96 Water Vapor Transmission of Materials
- E 119 Methods of Fire Tests of Building Construction and Materials
- E 283 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors
- E 330 Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

Siding

American Society for Testing and Materials (ASTM)

- D 3679 Specification for Rigid Poly (Vinyl Chloride) (PVC) Siding
- E 241 Increasing Durability of Building Constructions Against Water-Induced Damage, Recommended Practices for

The Aluminum Association, Inc. (AA)

- 35-80 Specifications for Aluminum Sheet Metal Work in Building Construction

American Architectural Manufacturers Association (AAMA)

- 1402-86 Standard Specifications for Aluminum Siding, Soffit & Fascia
- 1407.1-78 Voluntary Specifications for a Single Component Sealant for Residential Sheet Products

American Hardboard Association (AHA)

- A135.6 Hardboard Siding

American National Standards Institute (ANSI)

- A208.1 Mat Formed Wood Particleboard

National Association of Architectural Metal Manufacturers (NAAMM)

- Metal Finishes Manual

Vinyl Siding Institute (VSI)

- ASTM Specifications for Vinyl Building Products

Exterior Metal Doors

General

American Society for Testing and Materials (ASTM)

- B 117 Method of Salt Spray (Fog) Testing
- C 236 Test Method for Steady-State Thermal Performance of Building Assemblies by means of a Guarded Hot Box
- E 90 Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
- E 152 Methods of Fire Tests
- E 283 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors
- E 330 Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 413 Classification for Determination of Sound Transmission Class
- E 547 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential
- E 783 Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors

National Association of Architectural Metal Manufacturers (NAAMM)

CHM-1 Specifications for Custom Hollow Metal Doors and Frames
HMDF-1 Guide Specifications for Detention Security Hollow Metal Doors and Frames
HMDF-2 Guide Specifications for Commercial Security Hollow Metal Doors and Frames
HMDF-3 Guide Specifications for Light Duty Hollow Metal Doors and Frames
Fire Rated Hollow Metal Doors and Frames
Hollow Metal Technical and Design Manual
Metal Finishes Manual

National Fire Protection Association (NFPA)

80 Fire Doors and Windows
252 Methods of Fire Tests of Door Assemblies

Underwriters Laboratories, Inc. (UL)

10B Fire Tests of Door Assemblies

Steel and Stainless Steel Doors & Frames

American National Standards Institute (ANSI)

119 Performance Test Procedures for Steel Door Frames and Frame Anchors
A115 Series Specifications for Steel Door and Frame Preparation for Hardware
A151.1 Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors
and Hardware Reinforcings

Door & Hardware Institute (DHI)

BHMA 1301 Standard for Materials and Finishes
The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood
Frames, and Builders' Hardware

Steel Door Institute (SDI)

100 Recommended Specifications for Standard Steel Doors & Frames
105 Recommended Erection Instructions for Steel Frames
106 Recommended Standard Door Type Nomenclature
107 Hardware on Steel Doors (Reinforcement-Application)
108 Recommended Selection & Usage for Standard Steel Doors
109 Hardware for Standard Steel Doors & Frames
110 Standard Steel Doors & Frames for Modular Masonry Construction
111 Recommended Standard Details Steel Doors & Frames
113 Test Procedure and Acceptance Criteria for Apparent Thermal Performance for Steel Door
and Frame Assemblies
114 Test Procedure and Acceptance Criteria for Acoustical Performance for Steel Door and
Frame Assemblies
116 Standard Test Procedure and Acceptance Criteria for Rate of Air Flow Through Closed
Steel Door and Frame Assemblies
117 Manufacturing Tolerances Standard Steel Doors & Frames
118 Basic Fire Door Requirements

Aluminum Doors and Frames

The Aluminum Association (AA)

- 1 Aluminum Standards and Data
- 46 Standards for Anodized Architectural Aluminum

American Architectural Manufacturers Association (AAMA)

- 603 Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum
- 605 Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels
- 606 Voluntary Guide Specification and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum
- 607 Voluntary Guide Specification and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum
- 608 Voluntary Guide Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum
- 609 Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum
- 610 Voluntary Guide Specification for Cleaning and Maintenance of Painted Aluminum Extrusions and Curtain Wall Panels
- 701 Voluntary Specification for Pile Weather Strip

American Welding Society (AWS)

- A5.10 Specification for Bare Aluminum and Aluminum Alloy Welding Rods
- D1.2 Structural Welding Code-Aluminum

Wood Doors

American National Standards Institute (ANSI)

- A135.4 Basic Hardboard
- A208.1 Mat-formed Wood Particleboard
- I.S.1 Series Wood Flush Doors

American Society for Testing and Materials (ASTM)

- C 236 Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box
- E 84 Test Method for Surface Burning Characteristics of Building Materials
- E 90 Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
- E 119 Methods of Fire Tests of Building Construction and Materials
- E 152 Methods of Fire Tests of Door Assemblies
- E 283 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors
- E 330 Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 413 Classification for Determination of Sound Transmission Class

- E 547 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential
- E 783 Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors

Architectural Woodwork Institute (AWI)

Architectural Woodwork Quality Standards, Guide Specifications, and Quality Certification Program

Factory Mutual Engineering & Research Corporation (FM)

Building Materials: Fire Doors

National Fire Protection Association (NFPA)

- 80 Standard for Fire Doors and Windows
- 251 Methods of Fire Tests of Building Construction & Materials
- 252 Methods of Fire Tests of Door Assemblies

Underwriters Laboratories, Inc. (UL)

10B Fire Tests of Door Assemblies

Door and Hardware Institute (DHI)

Wood Door Hardware Standards: Series W1/W9 Hardware Preparation

Fir & Hemlock Door Association (FHDA)

- 1 Industry Security Performance Standard for Exterior Wood Panel Doors
- 7 Industry Standard for Douglas Fir, Western Hemlock, and Sitka Spruce Doors

National Electrical Manufacturers Association (NEMA)

LD 3 High-Pressure Decorative Laminates

National Wood Window & Door Association (NWWDA)

- I.S.4 Water-Repellent Preservative Treatment for Millwork
- I.S.610 Minimum Performance Standard for Air Infiltration Resistance of Exterior Wood Swinging Door Systems
- I.S.620 Minimum Performance Standard for Water Penetration Resistance of Exterior Wood Swinging Doors

Exterior Glazed Doors

General

American National Standards Institute (ANSI)

Z97.1 Safety Glazing Materials Used in Buildings—Safety Performance Specifications and Methods of Test

American Society for Testing and Materials (ASTM)

- C 509 Specification for Cellular Elastomeric Preformed Gasket and Sealing Material
- C 542 Specification for Lock-Strip Gaskets
- C 1036 Specification for Flat Glass

- E 283 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors
- E 330 Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 546 Test Method for Frost Point of Sealed Insulating Glass Units
- E 547 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential
- E 773 Test Method for Seal Durability of Sealed Insulating Glass Units
- E 774 Specification for Sealed Insulating Glass Units
- E 783 Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors

Consumer Product Safety Commission (CPSC)

16 CFR 1201 Architectural Glazing Standards and Related Materials

American Architectural Manufacturers Association (AAMA)

- 701.2 Voluntary Specification for Pile Weather Strip
- 808.3 Voluntary Specification for Exterior Perimeter Sealing Compound
- 809.2 Voluntary Specification for Non-Drying Sealants
- 820.1 Voluntary Test Methods for Sealants
- 1502.7 Voluntary Test Method for Condensation Resistance of Windows, Doors, and Glazed Wall Sections
- 1503.1 Voluntary Test Method for Thermal Transmittance of Windows, Doors, and Glazed Wall Sections

Flat Glass Marketing Association (FGMA)

Glazing Manual

Sealant Manual

Glass Tempering Association (GTA)

Engineering Standards Manual

Sealed Insulating Glass Manufacturers Association (SIGMA)

- A-200 Voluntary Test Methods and Voluntary Performance Quality Assurance Criteria for Spacers for Sealing Insulating Glass Units
- A-2801 Recommended Voluntary In-Plant Test Methods and Performance Criteria for Dessicants for Sealing Insulating Glass Units
- 65 Sealed Insulating Glass Units

Sliding Glass Doors

Aluminum Association, Inc. (AA)

SAA-38 Standards for Anodized Architectural Aluminum

American National Standards Institute (ANSI)

- 101 Voluntary Specifications for Aluminum Prime Windows and Sliding Glass Doors
- 101V Poly (Vinyl Chloride) (PVC) Prime Windows and Sliding Glass Doors

- 1002.10 Voluntary Specifications for Aluminum Insulating Storm Products for Windows and Sliding Glass Doors
- A156.10 Power Operated Pedestrian Doors
- A156.14 Sliding and Folding Door Hardware
- Z97.1 Safety Glazing Materials Used in Buildings—Safety Performance Specifications and Methods of Test

American Society for Testing and Materials (ASTM)

- B 117 Method of Salt Spray (Fog) Testing
- B 580 Specification for Anodic Oxide Coatings on Aluminum

American Architectural Manufacturers Association (AAMA)

- 906.3 Voluntary Specification for Aluminum Sliding Glass Door Roller Assemblies
- 1303.5 Voluntary Specifications for Forced-Entry Resistant Aluminum Sliding Glass Doors

Door & Hardware Institute (DHI)

- A156.10 Power Operated Pedestrian Doors

National Association of Architectural Metal Manufacturers (NAAMM)

- Metal Finishes Manual
- Hollow Metal Technical and Design Manual

National Wood Window & Door Association (NWWDA)

- I.S.3 Standard for Wood Sliding Patio Doors

Steel Structures Painting Council (SSPC)

- Steel Structures Painting Manual
 - Vol 1—Good Painting Practice
 - Vol 2—Systems and Specifications

Entrances, Storefronts, Revolving Doors

Aluminum Association, Inc. (AA)

- SAA-38 Standards for Anodized Architectural Aluminum

American Architectural Manufacturers Association (AAMA)

- SFDM-1 Aluminum Storefront and Entrance Design Guide Manual
- TIR-A1 Sound Control for Aluminum Curtain Walls and Windows
- TIR-A4 Recommended Glazing Guidelines for Reflective Insulating Glass
- 1502.7 Voluntary Test Method for Condensation Resistance of Windows, Doors and Glazed Wall Sections
- CW-10 Care and Handling of Architectural Aluminum From Shop to Site
- CW-12 Structural Properties of Glass
- 501 Methods of Test for Metal Curtain Walls
- 603.8 Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum
- 605.2 Specification for High Performance Organic Coatings on Architectural Extrusions and Panels
- 606.1 Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum

- 607.1 Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum
- 608.1 Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum

American Institute of Steel Construction (AISC)

S324A Guide to the Shop Painting of Structural Steel

National Association of Architectural Metal Manufacturers (NAAMM)

Hollow Metal Technical and Design Manual

Door Hardware

Architectural Woodwork Institute (AWI)

Quality Standards

National Fire Protection Association (NFPA)

- 80 Fire Doors and Windows
- 101 Code for Safety to Life from Fire in Buildings and Structures
- 252 Fire Tests of Door Assemblies

Underwriters Laboratories, Inc. (UL)

- 10B Fire Tests of Door Assemblies
- 305 Panic Hardware

Automatic Door Equipment

American National Standards Institute (ANSI)

- A156.10 Power Operated Pedestrian Doors
- A156.19 Power Assist and Low Energy Power Operated Doors

National Electrical Manufacturers Association (NEMA)

NEMA MG 1 Motors and Generators

Underwriters Laboratories, Inc. (UL)

- 325 Electric Door, Drapery, Gate, Louver and Window Operators and Systems

Windows

General

American National Standards Institute (ANSI)

- Z97.1-84 Safety Glazing Materials Used in Buildings—Safety Performance Specifications and Methods of Test

American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)
Handbook of Fundamentals: Chapter 27, Fenestration

American Society for Testing and Materials (ASTM)

- E 163 Methods of Fire Tests of Window Assemblies
- E 283 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors
- E 330 Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 405 (1981) Methods of Wear Testing Rotary Operators for Windows
- E 546 Test Method for Frost Point of Sealed Insulating Glass Units
- E 547 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential
- E 576 Test Method for Dew/Frost Point of Sealed Insulating Glass Units in Vertical Position
- E 737 Practice for Installation of Storm Windows, Replacement Windows, Multi-Glazing, Storm Doors, and Replacement Doors
- E 773 Test Method for Seal Durability of Sealed Insulating Glass Units
- E 774 Specification for Sealed Insulating Glass Units
- E 783 Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
- E 987 Test Methods for Deglazing Force of Fenestration Products
- E 997 Test Method for Structural Performance of Glass in Exterior Windows, Curtain Walls, and Doors Under the Influence of Uniform Static Loads by Destructive Method
- E 998 Test Method for Structural Performance of Glass in Windows, Curtain Walls, and Doors Under the Influence of Uniform Static Loads by Nondestructive Method
- E 1017 Specification for Generic Performance Requirements for Exterior Window Assemblies
- E 1105 Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference
- F 588 Test Methods for Resistance of Window Assemblies to Forced Entry Excluding Glazing

Flat Glass Marketing Association (FGMA)

Glazing Manual
Sealant Manual

Consumer Product Safety Commission (CPSC)

16 CFR 1201 Architectural Glazing Standards and Related Material

National Fire Protection Association (NFPA)

80 Fire Doors and Windows
257 Fire Tests of Window Assemblies

Sealed Insulating Glass Manufacturers Association (SIGMA)

- A-200 Voluntary Test Methods and Voluntary Performance Quality Assurance Criteria for Spacers for Sealing Insulating Glass Units
- A-2801 Recommended Voluntary In-Plant Test Methods and Performance Criteria for Dessicants for Sealing Insulating Glass Units
- 65 Sealed Insulating Glass Units

Underwriters Laboratories, Inc. (UL)

9 Fire Tests of Window Assemblies

Metal Windows

American Architectural Manufacturers Association (AAMA)

- AWS-1 Architectural Aluminum Window Selection Guide Manual
- GS-001 Voluntary Guide Specifications for Aluminum Architectural Windows
- 101 Voluntary Specifications for Aluminum Prime Windows and Sliding Glass Doors
- 603-8 Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum
- 604-2 Voluntary Specification for Residential Color Anodic Coating
- 605.2 Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels
- 606.1 Voluntary Guide Specification and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum
- 607.1 Voluntary Guide Specification and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum
- 608.1 Voluntary Guide Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum
- 1002.10 Voluntary Specifications for Aluminum Insulating Storm Products for Windows and Sliding Glass Doors
- 1302 Voluntary Specifications for Forced-Entry Resistant Aluminum Prime Windows
- 1502.7 Voluntary Test Method for Condensation Resistance of Windows, Doors, and Glazed Wall Sections
- 1503.1 Voluntary Test Method for Thermal Transmittance of Windows, Doors, and Glazed Wall Sections
- 1504 Voluntary Standards for Thermal Performance of Residential Windows and Sliding Glass Doors

American National Standards Institute (ANSI)

- H35.2 Dimensional Tolerances for Aluminum Mill Products

Aluminum Association, Inc. (AA)

- SAA-38 Standards for Anodized Architectural Aluminum

National Association of Architectural Metal Manufacturers (NAAMM)

- Metal Finishes Manual

Steel Window Institute (SWI)

- Steel Windows Specifications

Wood Windows

Architectural Woodwork Institute (AWI)

- Section 1000 Exterior Windows
- Section 1100 Screens

National Wood Window & Door Association (NWWDA)

- 1.S.2 Industry Standard for Wood Window Units
- 1.S.4 Industry Standard for Water-Repellent Preservative Treatment for Millwork

Tubular Plastic Windows

American Society for Testing and Materials (ASTM)
D4099 Poly (Vinyl Chloride) (PVC) Prime Windows

Glazing and Glazed Curtain Walls

American Architectural Manufacturers Association (AAMA)

- SFDM-1 Aluminum Storefront and Entrance Design Guide Manual
- TIR-A1 Sound Control for Aluminum Curtain Walls and Windows
- TIR-A4 Recommended Glazing Guidelines for Reflective Insulating Glass

- 1502.7 Voluntary Test Method for Condensation Resistance of Windows, Doors and Glazed Wall Sections
- CW-1-9 Aluminum Curtain Wall Design Guide Manual
- CW-10 Care and Handling of Architectural Aluminum From Shop to Site
- CW-12 Structural Properties of Glass
- CW-13 Structural Sealant Glazing Systems
- Series 11 Design Windloads for Buildings and Boundary Layer Wind Tunnel Testing
- Series 13 Structural Sealant Glazing Systems
- 501 Methods of Test for Metal Curtain Walls
- 603.8 Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum
- 605.2 Specification for High Performance Organic Coatings on Architectural Extrusions and Panels
- 606.1 Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum
- 607.1 Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum
- 608.1 Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum
- Voluntary Standard for Sealants: (AAMA 801.1 through 809.2)
- FC-1 Field Check of Metal Curtain Walls for Water Leakage

American National Standards Institute (ANSI)

- Z97.1-84 Safety Glazing Materials Used in Buildings—Safety Performance Specifications and Methods of Test

American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)

Handbook of Fundamentals: Chapter 27, Fenestration

American Society for Testing and Materials (ASTM)

- C 1036 Flat Glass
- C 1048 Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass
- E 163 Methods of Fire Tests of Window Assemblies
- E 283 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors
- E 330 Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

- E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 405 (1981) Methods of Wear Testing Rotary Operators for Windows
- E 413 Classification for Determination of Sound Transmission Class
- E 546 Test Method for Frost Point of Sealed Insulating Glass Units
- E 547 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential
- E 576 Test Method for Dew/Frost Point of Sealed Insulating Glass Units in Vertical Position
- E 737 Practice for Installation of Storm Windows, Replacement Windows, Multi-Glazing, Storm Doors, and Replacement Doors
- E 773 Test Method for Seal Durability of Sealed Insulating Glass Units
- E 774 Specification for Sealed Insulating Glass Units
- E 783 Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
- E 987 Test Methods for Deglazing Force of Fenestration Products
- E 997 Test Method for Structural Performance of Glass in Exterior Windows, Curtain Walls, and Doors Under the Influence of Uniform Static Loads by Destructive Method
- E 998 Test Method for Structural Performance of Glass in Windows, Curtain Walls, and Doors Under the Influence of Uniform Static Loads by Nondestructive Method
- E 1017 Specification for Generic Performance Requirements for Exterior Window Assemblies
- E 1105 Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference
- F 588 Test Methods for Resistance of Window Assemblies to Forced Entry Excluding Glazing

Flat Glass Marketing Association (FGMA)

Glazing Manual

Sealant Manual

Consumer Product Safety Commission (CPSC)

16 CFR 1201 Architectural Glazing Standards and Related Material

Laminators Safety Glass Association (LSGA)

Standards Manual

National Fire Protection Association (NFPA)

80 Fire Doors and Windows

257 Fire Tests of Window Assemblies

Sealed Insulating Glass Manufacturers Association (SIGMA)

A-200 Voluntary Test Methods and Voluntary Performance Quality Assurance Criteria for Spacers for Sealing Insulating Glass Units

A-2801 Recommended Voluntary In-Plant Test Methods and Performance Criteria for Dessicants for Sealing Insulating Glass Units

65 Sealed Insulating Glass Units

Underwriters Laboratories, Inc. (UL)

9 Fire Tests of Window Assemblies

A-7. INTERIOR CONSTRUCTION

Interior Partitions

Masonry Wall Construction

General

International Masonry Industry All-Weather Council (IMIAC)

Recommended Practices and Guide Specifications for Cold-Weather Masonry Construction

Mortar

American Society for Testing and Materials (ASTM)

- C 91 Specification for Masonry Cement (ANSI/ASTM C91)
- C 144 Specification for Aggregate for Masonry Mortar
- C 150 Specification for Portland Cement
- C 270 Specification for Mortar for Unit Masonry
- C 404 Specification for Aggregates for Masonry Grout
- C 476 Specification for Grout for Masonry

Brick Institute of America (BIA)

Technical Notes on Brick Construction

- 8 REV Portland Cement—Lime Mortars for Brick Masonry
- 8A Standard Specification for Portland Cement—Lime Mortar for Brick Masonry
- 8B Mortar for Brick Masonry Selection and Controls
- 11E Guide Specifications for Brick Masonry, Part V

National Concrete Masonry Association (NCMA)

TEK Bulletins

- 20 Mortars for Concrete Masonry
- 23A Grouting for Concrete Masonry Walls
- 71 Cold-Weather Construction with Masonry Construction
- 85 Building Weathertight Concrete Masonry Walls

Portland Cement Association (PCA)

- ISO41M Building Weathertight Concrete Masonry Walls
- EB008M Concrete Masonry Handbook
- IS040M Mortars for Masonry Walls

Concrete Unit Masonry

American National Standards Institute (ANSI)

- A41.1 Building Code Requirements for Masonry
- A41.2 Building Code Requirements for Reinforced Masonry

American Society for Testing and Materials (ASTM)

- C 55 Specification for Concrete Building Brick
- C 90 Specification for Hollow Load-Bearing Concrete Masonry Units
- C 129 Specification for Non-Load-Bearing Concrete Masonry Units

- C 145 Specification for Solid Load-Bearing Concrete Masonry Units
- C 270 Specification for Mortar for Unit Masonry
- C 476 Specification for Grout for Masonry
- C 744 (R1985) Specification for Prefaced Concrete and Calcium Silicate Masonry Units

American Concrete Institute (ACI)

- 530 Proposed Building Code Requirements for Masonry Structures
- 530.1 Proposed Specifications for Masonry Structures
- 531 Building Code Requirements for Concrete Masonry Structures
- 531.1 Specification for Concrete Masonry Construction

National Concrete Masonry Association (NCMA)

- TR 68A Design and Construction of Plain and Reinforced Concrete Masonry Basement and Foundation Walls
- TR 75B Specification for the Design and Construction of Load-Bearing Concrete Masonry
- TR 83 Nonreinforced Concrete Masonry Design Tables
- TR 84 Reinforced Concrete Masonry Design Tables
- TR 90 Architectural & Engineering Concrete Masonry Details for Building Construction
- TR 93 Design Tables for Reinforced Concrete Masonry Lintels for Concrete Masonry Structures
- TR 95 ASTM Specifications for Concrete Masonry Units
- TR 96 Building Code Requirements for Concrete Masonry Structures
- TEK 2A Sizes and Shapes of Concrete Masonry Units
- TEK 3 Control of Wall Movement with Concrete Masonry
- TEK 11A Reinforced Concrete Masonry—An Established Structural System
- TEK 20A Mortars for Concrete Masonry
- TEK 23A Grouting for Concrete Masonry Walls
- TEK 36A ASTM Specifications for Concrete Masonry Units
- TEK 49 Concrete Masonry Sizes, Shapes, Forms, and Functions
- TEK 53 Design of Concrete Masonry for Crack Control
- TEK 59 Reinforced Concrete Masonry Construction
- TEK 60 HUD-FHA Requirements for Concrete Masonry Construction
- TEK 108 Testing Concrete Masonry Assemblages

Portland Cement Association (PCA)

- IS041M Building Weathertight Concrete Masonry Walls
- EB008M Concrete Masonry Handbook
- IS040M Mortars for Masonry Walls
- LT107M Recommended Practices and Guide Specifications for Cold-Weather Masonry Construction
- PA043M Recommended Practices for Laying Concrete Block

Cold-Formed Metal Framing Wall Construction

American Society for Testing and Materials (ASTM)

- A 123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- A 446 Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
- A 525 Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

- C 79 Specification for Gypsum Sheathing Board
C 955 Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Track),
and Bracing or Bridging for Screw Application of Gypsum Board and Metal Plaster
Bases

American Iron and Steel Institute (AISI)

Specification for the Design of Cold-Formed Steel Structural Members

American Welding Society, Inc. (AWS)

D1.1 Structural Welding Code

D1.3 Structural Welding Code—Sheet Steel

Metal Lath/Steel Framing Association (ML/SFA)

Light Gauge Steel Framing Fabrication Guide

Light Gauge Steel Framing Specifications

Lightweight Steel Framing Systems Manual

Physical Property Selection Charts

Technical Information File

Association of Wall and Ceiling Industries (AWCI)

Specifications Guide for Cold Formed Steel Structural Members

Steel Structures Painting Council (SPCC)

Steel Structures Painting Manual

Metal Framing Manufacturers Association (MFMA)

Guidelines for the Use of Metal Framing

Wood Frame Wall Construction

American Society for Testing and Materials (ASTM)

A 307 Specification for Carbon Steel Externally Threaded Standard Fasteners

C 79 Specification for Gypsum Sheathing Board

D 2277 Specification for Fiberboard Nail-Base Sheathing

American Hardwood Association (AHA)

A135.4 Basic Hardboard

American Institute of Timber Construction (AITC)

Timber Construction Manual

American Lumber Standards Committee (ALSC)

PS 20 American Softwood Lumber Standard. Certified Agencies and Typical Grade Stamps

American National Standards Institute (ANSI)

A208.1 Mat-Formed Wood Particleboard

American Plywood Association (APA)

J20 Grades & Specifications

Y510 Plywood Design Specification

California Redwood Association (CRA), Redwood Inspection Service (RIS)
Standard Specifications for Grades of California Redwood Lumber

National Forest Products Association (NFoPA)
National Design Specifications for Wood Construction Wood Structural Design Data

Southern Pine Inspection Bureau (SPIB)
Grading Rules

West Coast Lumber Inspection Bureau (WCLIB)
Grading Rules

Western Wood Products Association (WWPA)
Grading Rules for Western Lumber

Demountable, Moveable, or Operable Partitions

- American Society for Testing and Materials (ASTM)
- A 446 Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
 - B 221 Aluminum-Alloy Extruded Bar, Rod, Wire, Shape and Tube
 - C 36 Gypsum Wallboard
 - C 423 Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - C 645 Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board
 - C 646 Steel Drill Screws for the Application of Gypsum Sheet Material to Light Gage Steel Studs
 - C 754 Installation of Framing Members to Receive Screw-Attached Gypsum Wallboard, Backing Board, or Water-Resistant Backing Board
 - E 84 Test Method for Surface Burning Characteristics of Building Materials
 - E 90 Test method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
 - E 119 Test Methods for Fire Tests of Building Construction and Materials
 - E 162 Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source
 - E 336 Test Method for Measurement of Airborne Sound Insulation in Buildings
 - E 413 Classification for Determination of Sound Transmission Class
 - E 557 Practice for Architectural Application and Installation of Operable Partitions
 - E 596 Test Method for Laboratory Measurement of the Noise Reduction of Sound-Isolating Enclosures

Interior Wood Doors

- American National Standards Institute (ANSI)
- A135.4 Basic Hardboard
 - A208.1 Mat-Formed Wood Particleboard
 - I.S.1 Series Wood Flush Doors

American Society for Testing and Materials (ASTM)

- E 84 Test Method for Surface Burning Characteristics of Building Materials
- E 90 Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
- E 119 Methods of Fire Tests of Building Construction and Materials
- E 152 Methods of Fire Tests of Door Assemblies
- E 413 Classification for Determination of Sound Transmission Class

Architectural Woodwork Institute (AWI)

Architectural Woodwork Quality Standards, Guide Specifications, and Quality Certification Program

Factory Mutual Engineering & Research Corporation (FM)

Building Materials: Fire Doors

National Fire Protection Association (NFPA)

- 80 Standard for Fire Doors and Windows
- 251 Methods of Fire Tests of Building Construction & Materials
- 252 Methods of Fire Tests of Door Assemblies

Underwriters Laboratories, Inc. (UL)

10B Fire Tests of Door Assemblies

Door and Hardware Institute (DHI)

Wood Door Hardware Standards: Series W1/W9 Hardware Preparation

Fir & Hemlock Door Association (FHDA)

- 1 Industry Security Performance Standard for Exterior Wood Panel Doors
- 7 Industry Standard for Douglas Fir, Western Hemlock, and Sitka Spruce Doors

National Electrical Manufacturers Association (NEMA)

LD 3 High-Pressure Decorative Laminates

Interior Glazed Doors

General

American National Standards Institute (ANSI)

- Z97.1 Safety Glazing Materials Used in Buildings—Safety Performance Specifications and Methods of Test

American Society for Testing and Materials (ASTM)

- C 509 Specification for Cellular Elastomeric Preformed Gasket and Sealing Material
- C 542 Specification for Lock-Strip Gaskets
- C 1036 Specification for Flat Glass

Consumer Product Safety Commission (CPSC)

16 CFR 1201 Architectural Glazing Standards and Related Materials

Flat Glass Marketing Association (FGMA)
Glazing Manual
Sealant Manual

Glass Tempering Association (GTA)
Engineering Standards Manual

Sliding Glass Doors

Aluminum Association, Inc. (AA)
SAA-38 Standards for Anodized Architectural Aluminum

American National Standards Institute (ANSI)
101 Voluntary Specifications for Aluminum Prime Windows and Sliding Glass Doors
101V Poly (Vinyl Chloride) (PVC) Prime Windows and Sliding Glass Doors
1002.10 Voluntary Specifications for Aluminum Insulating Storm Products for Windows and Sliding Glass Doors
A156.10 Power Operated Pedestrian Doors
A156.14 Sliding and Folding Door Hardware
Z97.1 Safety Glazing Materials Used in Buildings—Safety Performance Specifications and Methods of Test

American Society for Testing and Materials (ASTM)
B 580 Specification for Anodic Oxide Coatings on Aluminum

American Architectural Manufacturers Association (AAMA)
906.3 Voluntary Specification for Aluminum Sliding Glass Door Roller Assemblies
1303.5 Voluntary Specifications for Forced-Entry Resistant Aluminum Sliding Glass Doors

Door & Hardware Institute (DHI)
A156.10 Power Operated Pedestrian Doors

National Association of Architectural Metal Manufacturers (NAAMM)
Metal Finishes Manual
Hollow Metal Technical and Design Manual

National Wood Window & Door Association (NWWDA)
I.S.3 Standard for Wood Sliding Patio Doors

Door Hardware

Architectural Woodwork Institute (AWI)
Quality Standards

National Fire Protection Association (NFPA)
80 Fire Doors and Windows
252 Fire Tests of Door Assemblies

Underwriters Laboratories, Inc. (UL)
10B Fire Tests of Door Assemblies
305 Panic Hardware

Automatic Door Equipment

American National Standards Institute (ANSI)
A156.10 Power Operated Pedestrian Doors
A156.19 Power Assist and Low Energy Power Operated Doors

National Electrical Manufacturers Association (NEMA)
NEMA MG 1 Motors and Generators

National Fire Protection Association (NFPA)
101 Code for Safety to Life from Fire in Buildings and Structures

Underwriters Laboratories, (UL)
325 Electric Door, Drapery, Gate, Louver and Window Operators and Systems

Access Flooring

National Fire Protection Association (NFPA)
75 Protection of Electronic Computer/Data Processing Equipment

Underwriters Laboratories, Inc. (UL)
779 Electrically Conductive Floorings

American Concrete Institute (ACI)
117 Standard Tolerances for Concrete Construction and Materials

American National Standards Institute (ANSI)
A208.1 Mat-Formed Wood Particleboard

American Society of Testing and Materials (ASTM)
E 84 Surface Burning Characteristics of Building Materials
E 196 Practice for Gravity Load Testing of Floors and Flat Roofs
E 648 Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
E 695 Method of Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading

Ceilings & Interior Systems Construction Association (CISCA)
Recommended Test Procedures for Access Floors

National Electrical Manufacturers Association (NEMA)
LD 3 High-Pressure Decorative Laminates
LD 3.1 Performance, Application, Fabrication, and Installation of High-Pressure Decorative Laminates

A-8. INTERIOR FINISHES

Gypsum Board

American Society for Testing and Materials (ASTM)

- C 36 Specification for Gypsum Wallboard
- C 79 Specification for Gypsum Sheathing Board
- C 442 Specification for Gypsum Backing Board and Coreboard
- C 475 Specification for Joint Treatment Materials for Gypsum Wallboard Construction
- C 514 Specification for Nails for the Application of Gypsum Wallboard
- C 630 Specification for Water-Resistant Gypsum Backing Board
- C 645 Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board
- C 754 Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Wallboard, Backing Board, or Water-Resistant Backing Board
- C 840 Specification for Application and Finishing of Gypsum Board
- C 931 Specification for Exterior Gypsum Soffit Board
- C 1002 Specification for Steel Drill Screws for the Application of Gypsum Board
- E 84 Test Method for Surface Burning Characteristics of Building Materials
- E 90 Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
- E 119 Methods of Fire Tests of Building Construction and Materials
- E 336 Test Method for Measurement of Airborne Sound Insulation in Buildings
- E 413 Classification for Rating Sound Insulation

Gypsum Association (GA)

- 201 Using Gypsum Board for Walls and Ceilings
- 203 Installation of Screw-Type Steel Framing Members to Receive Gypsum Board
- 219 Recommendations for Installation of Steel Door Frames in Steel Stud Gypsum Board Fire Rated Partitions
- 216 Recommended Specifications for the Application and Finishing of Gypsum Board
- 224 Recommendations for Installation of Steel Door Frames in Steel Stud Gypsum Board Fire Rated Partitions
- 252 Fire Resistant Gypsum Sheathing
- 600 Fire Resistance Design Manual

Liquid Finishes/Paints

General

Consumer Product Safety Commission (CPSC)

- 16 CFR 1303 Lead-Containing Paints

Painting and Decorating Contractors of America (PDCA)

- Painting Specifications Manual.

Abrasion-Resistant Coatings

American Society for Testing and Materials (ASTM)

- D 658 Test Method for Abrasion Resistance of Organic Coatings by Air Blast Abrasive.
- D 968 Test Methods for Abrasion Resistance of Organic Coatings by Failing Abrasive.
- D 2370 Test Method for Tensile Properties of Organic Coatings.
- D 3170 Test Method for Chipping Resistance of Coatings.
- D 4060 Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
- D 4213 Test Method for Wet Abrasion Resistance of Interior Paints.
- E 84 Test Method for Surface Burning Characteristics of Building Materials.
- F 735 Test Method for Abrasion Resistance of Transparent Plastic and Coatings Using the Oscillating Sand Method.
- F 1128 Test Method for Abrasion Resistance of Transparent Plastics and Coatings Using Salt Impingement Method.

Elastomeric Coatings

American Society for Testing and Materials (ASTM)

- B 117 Method of Salt Spray (Fog) Testing.
- D 1653 Test Methods for Water Vapor Permeability of Organic Coating Films.
- D 1737 Test Method for Elongation of Attached Organic Coatings With Cylindrical Mandrel Apparatus.
- D 2243 Test Method for Freeze-Thaw Resistance of Latex and Emulsion Paints.
- D 2370 Test Method for Tensile Properties of Organic Coatings.
- D 3273 Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environment Chamber.
- E 84 Test Method for Surface Burning Characteristics of Building Materials.
- E 96 Test Methods for Water Vapor Transmission of Materials.
- E 23 Practice for Operating High-Exposure Apparatus (Carbon Arc Type) With and Without Water for Exposure of Nonmetallic Materials.
- G 26 Practice for Operating Light-Exposure Apparatus (Xenon Arc Type) With and Without Water For Exposure of Nonmetallic Materials.

Graffiti-Resistant Coatings

International Conference of Building Officials (ICBO)

Section 4302 Fire-Resistive Standards; Fire-Resistive Materials and Systems.

American Society for Testing and Materials (ASTM)

- C 722 Specification for Chemical-Resistant Resin Monolithic Surfacing.
- D 658 Test Method for Abrasion Resistance of Organic Coatings by Air Blast Abrasive.
- D 968 Test Methods for Abrasion Resistance of Organic Coatings by Failing Abrasive.
- D 2294 Test Method for Creep Properties of Adhesives in Shear by Tension Loading (Metal-To-Metal).
- D 2833 Index of Methods for Testing Architectural Paints and Coatings.
- D 3363 Test Method for Film Hardness by Pencil Test.

Painting

American Society for Testing and Materials (ASTM)

- D 360 Specification for Shellac Varnishes.
- D 2833 Index of Methods for Testing Architectural Paints and Coatings.

Wall Coverings and Surfaces

Wall Coverings

American Society for Testing and Materials (ASTM)

- D 751 Methods of Testing Coated Fabrics
- D 1308 Test Methods for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
- E 84 Test Method for Surface Burning Characteristics of Building Materials.
- F 793 Classification of Wallcovering by Durability Characteristics.
- G 21 Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

Chemical Fabrics and Film Association (CFFA)

Quality Standard for Vinyl-Coated Fabric Wall Covering

Painting and Decorating Contractors of America (PDCA)

Specifications Manual

Ceramic Tile

American National Standards Institute (ANSI)

- A108 Series Specifications for Installation of Ceramic Tile.
- A118 Series Specifications for Materials.
- A136.1 Organic Adhesives for Installation of Ceramic Tile.
- A137.1 Specifications for Ceramic Tile.

Ceramic Tile Institute of America (CTIA)

Ceramic Tile Manual

Tile Council of America, Inc (TCA)

Specifications for Ceramic Tile
Handbook for Ceramic Tile Installation

Plaster

American Society for Testing and Materials (ASTM)

- C 28 Specification for Gypsum Plasters.
- C 35 Specification for Inorganic Aggregates for Use in Gypsum Plaster.
- C 59 Specification for Gypsum Casting and Molding Plaster.
- C 61 Specification for Gypsum Keene's Cement.
- C 150 Specification for Portland Cement.
- C 206 Specification for Finishing Hydrated Lime.
- C 442 Gypsum Backing Board.

- C 587 Gypsum Veneer Plaster.
- C 588 Gypsum Base for Veneer Plasters.
- C 631 Specification for Bonding Compounds for Interior Plastering.
- C 841 Specification for Installation of Interior Lathing and Furring.
- C 842 Specification for Application of Interior Gypsum Plaster.
- C 843 Application of Gypsum Veneer Plaster.
- C 844 Application of Gypsum Base to Receive Gypsum Veneer Plaster.
- C 847 Specification for Metal Lath.
- C 933 Specification for Welded Wire Lath.
- C 1063 Specification for Installation of Lathing and Furring for Portland Cement-Based Plaster.
- E 90 Laboratory Measurement of Sound Transmission Loss of Building Partitions.
- E 119 Methods of Fire Tests of Building Construction and Materials.

Gypsum Association (GA)

Fire Resistance Design Manual

- 150 Application of Gypsum Base for Gypsum Veneer Plasters and Application of Gypsum Veneer Plaster.
- 216 Recommended Specifications for the Application and Finishing of Gypsum Board.

Metal Lath/Steel Framing Association (ML/SFA)

Specification for Metal Lathing and Furring.

- 101 Types of Metal Lath and Their Uses

Portland Cement Association (PCA)

EB049M Portland Cement Plaster (Stucco) Manual

Ceilings

Suspended Ceilings

American Society for Testing and Materials (ASTM)

- C 635 Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- C 636 Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
- E 580 Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint.

Flooring

Quarry Tile

Tile Council of America (TCA)

- A108.3 Quarry Tile and Paver Tile Installed With Portland Cement Mortar.
- A108.5 Ceramic Tile Installed With Dry-Set Portland Cement Mortar or Latex Portland Cement Mortar.
- A108.6 Ceramic Tile Installed With Chemical-Resistant, Water-Cleanable Tile-Setting and Grouting Epoxy.
- A118.1 Dry-Set Portland Cement Mortar.
- A118.3 Chemical-Resistant, Water-Cleanable Tile-Setting and Grouting Epoxy.

- A118.4 Latex-Portland Cement Mortar.
- A136.1 Organic Adhesives for Installation of Ceramic Tile, Type 1 and Type 2.
- A137.1 Specifications for Ceramic Tile.

Terrazzo

National Terrazzo & Mosaic Association, Inc. (NTMA)

Terrazzo Design Data

Terrazzo Technical Data

Wood Flooring

American Society for Testing and Materials (ASTM)

D 1324-83 Specification for Modified Wood.

D 2394-83 Methods for Simulated Service Testing of Wood and Wood-Base Finish Flooring.

E 84-87 Test Method for Surface Burning Characteristics of Building Materials.

E 492-86 Method of Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine.

National Fire Protection Association (NFPA)

703 Fire-Retardant Impregnated Wood and Fire-Retardant Coatings for Building Materials.

Maple Flooring Manufacturers Association, Inc. (MFMA)

MFMA Hard Maple Flooring

Grading Rules for Hard Maple.

National Oak Flooring Manufacturers Association (NOFMA)

Hardwood Flooring Finishing/Refinishing Manual

Hardwood Flooring Installation Manual.

Hardwood Floors, Walls, and Ceilings for Residential and Commercial Buildings.

Unit Masonry Flooring

American National Standards Institute (ANSI)

A 108 Specification for Installation of Ceramic Tile.

A 118 Series Specification for Materials.

A 136.1 Organic Adhesives for Installation of Ceramic Tile.

American Society for Testing and Materials (ASTM)

C 62 Specification for Building Brick (Solid Masonry Units Made From Clay or Shale).

C 902 Specification for Pedestrian and Light Traffic Paving Brick.

C 936 Specification for Solid Concrete Interlocking Paving Units.

Brick Institute of American (BIA)

14 Brick Floors and Pavements-Part 1 of 3.

14A Brick Floors and Pavements-Part 2 of 3.

14B Brick Floors and Pavements-Part 3 of 3.

National Concrete Masonry Association (NCMA)

TEK 75 Concrete Masonry Paving Block.

TEK 87 Construction of Concrete Masonry Pavements.

- TEK 91 Concrete Masonry Grid Pavers for Erosion Control.
TEK 150 Concrete Masonry Roof Paving.

Tile Council of America, Inc. (TCA)

Ceramic Tile: The Installation Handbook.

Resilient Flooring

American Society for Testing and Materials (ASTM)

- E 84 Test Method for Surface Burning Characteristics of Building Materials.
E 648 Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
E 662 Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
F 137 Test Method for Flexibility of Resilient Flooring Materials with Cylindrical Mandrel Apparatus.
F 142 Test Method for Indentation of Resilient Floor Tiles (McBurney Test).
F 150-159 Test Method for Electrical Resistance of Conductive Resilient Flooring.
F 386 Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces.
F 499 Practice for Installation of Wood Underlayment and Preparation of the Surface to Receive Resilient Flooring.
F 693 Practice for Sealing Seams of Resilient Sheet Flooring Products by Use of Liquid Seam Sealers.
F 510 Test Method for Resistance to Abrasion of Resilient Flooring Coverings Using an Abrader With a Grit Feed Method.
F 710 Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.
F 924 Test Method for Resistance to Puncture of Cushioned Resilient Flooring Coverings.

F 925 Test Method for Resistance to Chemicals of Resilient Flooring.
F 970 Test Method for Static Load Limit.
F 1066 Specification for Vinyl Composition Floor Tile.

Resilient Floor Covering Institute (RMCI)

Recommended Specification

Federal Specifications (FS)

- L-F-1641 Floor Covering, Translucent or Transparent Vinyl Surface, With Backing.
L-F-475 Floor Covering, Vinyl Surface (Tile and Roll), With Backing.

A-9. PLUMBING

General

American Welding Society (AWS)

- AWS D10.9 Specifications for Qualification of Welding Procedures and Welders for Piping and Tubing

Building Officials and Code Administrators (BOCA)
Basic/National Plumbing Code

International Council of Building Officials (ICBO)
Uniform Plumbing Code

Southern Building Code Congress, Inc (SBCCI)
Standard Plumbing Code

Plumbing Fixtures

American National Standards Institute (ANSI)
A112.6.1 Supports for Off-the-Floor Plumbing Fixtures for Public Use
A112.18.1 Finished and Rough Brass Plumbing Fixture Fittings
A112.19.1 Enameled Cast Iron Plumbing Fixtures
A112.19.2 Vitreous China Plumbing Fixtures
A112.19.4 Porcelain Enameled Formed Steel Plumbing Fixtures
A112.19.5 Trim for Water-Closet Bowls, Tanks, and Urinals (Dimension Standards)
Z124.1 Plastic Bathtub Units
Z124.2 Plastic Shower Receptors and Shower Stalls
Z358.1 Emergency Eyewash and Shower Equipment
1010 Drinking Fountains and Self-Contained, Mechanically Refrigerated Drinking-Water Coolers

Aboveground Plumbing

Piping Insulation

National Conference of States on Building Codes & Standards (NCSBCS)
Code for Energy Conservation in New Building Construction

National Fire Protection Association (NFPA)
90A Installation of Air Conditioning and Ventilating Systems
Fire Protection Handbook
Section 8-3 Heating Systems and Appliances
Section 8-4 Air Conditioning and Ventilating Systems

Underwriters Laboratories, Inc. (UL)
Building Materials Directory

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
Handbook of Fundamentals: Chapter 20, Thermal Insulation and Water Vapor Retarders

American Society of Plumbing Engineers (ASPE)
ASPE Data Book, Fundamentals of Plumbing Design, Vol. 1: Chapter 12 Insulation

Plumbing Piping

American National Standards Institute (ANSI)

- B31.1 Power Piping
- B31.2 Fuel Gas Piping
- B31.4 Liquid Petroleum Transportation Piping Systems
- B31.9 Building Service Piping

American Society of Mechanical Engineers (ASME)

Boiler and Pressure Vessel Code

- Sec 9 Welding and Brazing Qualifications
- B16.1 Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250, and 800
- B16.3 Malleable Iron Threaded Fittings
- B16.4 Cast Iron Threaded Fittings Class 125 and 250
- B16.8 Cast Bronze Solder-Joint Pressure Fittings
- B16.22 Wrought Copper and Bronze Solder-Joint Pressure Fittings
- B16.29 Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings—DWV
- B16.32 Cast Copper Alloy Solder-Joint Fittings for Solvent Drainage Systems

American Society for Testing and Materials (ASTM)

- A 47 Ferric Malleable Iron Castings
- A 53 Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless
- A 74 Cast Iron Soil Pipe and Fittings
- A 120 Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses
- A 234 Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
- B 32 Solder Metal
- B 42 Seamless Copper Pipe
- B 43 Seamless Red Brass Pipe
- B 75 Seamless Copper Tube
- B 88 Seamless Copper Water Tube
- B 251 Wrought Seamless Copper and Copper-Alloy Tube
- B 302 Threadless Copper Pipe (TP)
- B 306 Copper Drainage Tube (DWV)
- C 564 Rubber Gaskets for Cast Iron Soil Pipe and Fittings
- D 1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
- D 2235 Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings
- D 2241 Poly (Vinyl Chloride) (PVC) Plastic Pipe
- D 2466 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
- D 2513 Thermoplastic Gas Pressure Pipe, Tubing and Fittings
- D 2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
- D 2683 Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe
- D 2846 Chlorinated Polyvinyl Chloride (CPVC) Pipe, Fittings, Solvent Cements, and Adhesives for Potable Hot Water Systems
- D 2855 Making Solvent-Cemented Joints With Poly (Vinyl Chloride) (PVC) Pipe and Fittings
- D 3309 Polybutylene (PB) Plastic Hot Water Distribution System
- F 477 Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- F 845 Plastic Insert Fittings for Polybutylene (PB) Pipe

American Welding Society (AWS)

A5.8 Brazing Filler Metal

American Water Works Association (AWWA)

C105 Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids
C110 Ductile-Iron and Gray-Iron Fittings 3 in. through 48 in., for Water and Other Liquids
C111 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
C151 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-lined Molds, for Water
 or Other Liquids
C651 Disinfecting Water Mains

National Fire Protection Association (NFPA)

54 National Fuel Gas Code
58 Storage and Handling of Liquefied Petroleum Gases

Plumbing Specialities

American National Standards Institute (ANSI)

1011 Hose Connection Vacuum Breakers
1012 Backflow Preventers With Immediate Atmospheric Vent
1013 Backflow Preventers, Reduced Pressure Principle
1019 Wall Hydrants, Frost-Proof Automatic Draining Anti-Backflow Types
A112.21.1 Floor Drains
A112.21.2 Roof Drains
A112.26.1 Water Hammer Arrestors

American Water Works Association (AWWA)

C506 Backflow Prevention Devices—Reduced Pressure Principle and Double Check Valve
 Types

Plumbing Equipment

American National Standards Institute (ANSI)

30 Flammable and Combustible Liquids Code
54 National Fuel Gas Code
58 Storage and Handling of Liquefied Petroleum Gases
70 National Electrical Code

National Electrical Manufacturers Association (NEMA)

250 Enclosure for Electrical Equipment (1000 Volts Maximum)

A-10. HVAC

General

Equipment, Meters, and Regulators

Air Movement and Control Association (AMCA)

500 Test Methods for Louvers, Dampers and Shutters

American National Standards Institute (ANSI)

- A13.1 Scheme for the Identification of Piping Systems (ASME)
- B40.1 Gauges, Pressure and Vacuum, Indicating Dial Type- Elastic Element
- MG1 Motors and Generators (NEMA)
- 70 National Electrical Code (NFPA)
- 90A Installation of Air Conditioning and Ventilation Systems (NFPA)
- 112 Test Procedure for Polyphase Induction Motors and Generators (IEEE)
- 250 Enclosures for Electrical Equipment (1000 Volts Maximum) (NEMA)
- 778 Motor Operated Water Pumps (UL)

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

- 85 Automatic Control Terminology for Heating, Ventilating, Air Conditioning

American Society of Mechanical Engineers (ASME)

Boiler and Pressure Vessel Code

- B40.1 Gages - Pressure Indicating Dial Type - Elastic Element
- MC85.1 Terminology for Automatic Control
- MFC-3M Measurement of Fluid Flow in Pipes Using Orifice, Nozzle and Venturi

American Society for Testing and Materials (ASTM)

- C921 Properties of Jacketing Materials for Thermal Insulation
- D2458 Method of Flow Measurement by the Venturi Motor Tube
- E1 Specification for ASTM Thermometers
- E77 Verification and Calibration of Liquid-in-Glass Thermometers
- E84 Surface Burning Characteristics of Building Materials
- E96 Water Vapor Transmission of Materials

American Water Works Association (AWWA)

- C700 Cold Water Meters - Displacement Type
- C701 Cold Water Meters - Turbine Type for Customer Service
- C702 Cold Water Meters - Compound Type
- C706 Direct Reading Remote Registration Systems for Cold Water Meters
- M6 Water Meters - Selection, Installation, Testing, and Maintenance

Anti-Friction Bearing Manufacturers Association (AFBMA)

- 9 Load Ratings and Fatigue Life for Ball Bearings
- 11 Load Ratings and Fatigue Life for Roller Bearings

Compressed Gas Association (CGA)

- G-7 Compressed Air for Human Respiration
- P-2.1 Medical Surgical Vacuum Systems in Health Care Facilities
- V-5 Diameter Index Safety System Non Interchangeable Low Pressure Connections for Medical Gas Applications

Factory Mutual Engineering & Research Corp. (FM)

Factory Mutual System Approval Guide

Federal Specification (FS)

- W-C596 Electrical Power Connector, Plug, Receptacle, and Cable Outlet
- WW-V-35 Valve Ball
- WW-V-54 Valve, Gate, Bronze (125, 150 and 200 Pound, Screwed, Flanged, Solder End, For Land Use)

FS-GG-G-76

Gages, Pressure and Vacuum, Dial Indicating (for Air, Steam, Oil, Water, Ammonia, Chloro-Fluorohydrocarbon Gases, and Compressed Gases)

76 Gages, Pressure and Vacuum, Dial Indicating (for Air, Steam, Oil, Water, Ammonia, Chloro-Fluorohydrocarbon Gases, and Compressed Gases).

Instrument Society of America (ISA)

RP 3.2 Flange Mounted Sharp Edged Orifice Plates for Flow Measurement

Manufacturers Standardization Society of the Valve and Fittings Industry (MSS)

SP-69 Pipe Hangers and Supports Selection and Application

MIL-F-18280

Fittings, Flareless Tube, Fluid Connection

MIL-R-26557

Regulator, Pressure, Medical Gas Administration Apparatus

MIL-S-29175

Switch, Thermostatic, Low Voltage, Non- (Setback/Setup) and Setback/Setup, Limiting: Heating, Cooling and Heating-Cooling

MIL-V-82026

Valves, Diaphragm, Stop

National Electrical Manufacturers Association (NEMA)

DC 3 Low-Voltage Room Thermostats

EMC1 Energy Management Systems Definitions

250 Enclosures for Electrical Equipment (1000 Volts Maximum)

National Fire Protection Association (NFPA)

50 Bulk Oxygen Systems at Consumer Sites

99 Standard for Health Care Facilities

255 Surface Burning Characteristics of Building Materials

Underwriters Laboratories, Inc. (UL)

393 Indicating Pressure Gages for Fire and Protection Services

404 Gages, Indicating Pressure, for Compressed Gas Service

723 Surface Burning Characteristics of Building Materials

Heating System

Air-Conditioning and Refrigeration Institute (ARI)

210/240 Unitary Air-Conditioning and Air-Source Heat Pump Equipment

210 Unitary Air-Conditioning Equipment

240 Air Source Unitary Heat Pump Equipment

270 Sound Rating of Outdoor Unitary Equipment

410 Forced-Circulation Air-Cooling and Air-Heating Coils

430 Central-Station Air-Handling Units

435 Application of Central-Station Air-Handling Units

- 520 Positive Displacement Refrigerant Compressors, Compressor Units and Condensing Units
- 610 Central System Humidifiers
- 630 Selection, Installation and Servicing of Humidifiers

Air Movement and Control Association (AMCA)

- 99 Standards Handbook
- 210 Laboratory Methods of Testing Fans for Rating Purposes
- 261 Directory of Products Licensed to Bear the AMCA Certified Ratings Seal
- 300 Test Code for Sound Rating Air Moving Devices
- 301 Method of Calculating Fan Sound Ratings from Laboratory Test Data
- 301 Method of Publishing Sound Ratings for Air Moving Devices
- 500 Test Methods for Louver, Dampers, and Shutters

American Gas Association (AGA)

Directory of Certified Appliances and Accessories

American National Standards Institute (ANSI)

Boilers and Pressure Vessels Code Section 8D (ASME)

- B31.9 Building Services Piping (ASME)
- MG 1 Motors and Generators (NEMA)
- SEC1 Boiler and Pressure Vessels Code—Rules for Construction of Power Boilers (ASME)
- SEC4 Boiler and Pressure Vessel Codes—Rules for Construction of Heating Boilers (ASME)
- SEC8D Boilers and Pressure Vessel Codes—Rules for Construction of Pressure Vessels (ASME)
- Z21.13 Gas-Fired Low-Pressure Steam and Hot Water Boilers (AGA)
- Z223.1 National Fuel Gas Code (AGA)
- Z223.1 NFPA 54 National Fuel Gas Code Systems (NFPA)
- 15 Safety Code for Mechanical Refrigeration (ASHRAE)
- 31 Installation of Oil Burning Equipment (NFPA)
- 70 National Electrical Code (NFPA)
- 90A Energy Conservation in New Building Design (ASHRAE)
- 90A Installation of Air Conditioning and Ventilation
- 90B Installation of Warm Air Heating and Air Conditioning Systems (NFPA)
- 103 Heating Seasonal Efficiency of Central Furnaces and Boilers, Methods of Testing (ASHRAE)
- 90B Installation of Warm Air Heating and Air Conditioning Systems (NFPA)
- 207 Refrigerant—Containing Components and Accessories, Non-Electrical (UL)
- 211 Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances (NFPA)
- 303 Refrigeration and Air-Conditioning Condensing, and Air - Source Heat Pump Equipment (UL)
- 726 Oil-Fired Boiler Assemblies (UL)
- 727 Oil-Fired Central Furnaces (UL)
- 729 Oil-Fired Floor Furnaces (UL)

American Society for Testing and Materials (ASTM)

- D3309 Polybutylene (PB) Plastic Hot- and Cold-Water Distribution Systems

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

- 14 Methods of Testing for Rating Positive Displacement Condensing Units
- 52 Method of Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter
- 93 Methods of Testing To Determine the Thermal Performance of Solar Collectors
- 96 Methods of Testing To Determine the Thermal Performance of Unglazed Flat-Plate Liquid-Type Solar Collectors

Anti-Friction Bearing Manufacturers Association (AFBMA)

- 9 Load Ratings and Fatigue Life for Ball Bearings
- 11 Load Ratings and Fatigue Life for Roller Bearings
- 99 Standards Handbook

Federal Specification (FS)

- F-F 300A Filter, Air Conditioning: Viscous Impingement and Dry Types, Cleanable
- F-F 310A Filter, Air Conditioning: Viscous Impingement and Dry Types, Replaceable
- VV-F 815C Fuel Oil, Burner

Hydronics Institute (HI)

Testing and Rating Standard for Cast Iron and Steel Heating Boilers

MIL-F-17104E

Furnaces, Warm Air and Heaters, Unit, Forced Air Circulation, Oil-and Gas-Fired

National Electrical Manufacturers Association (NEMA)

- MG1 Motors and Generators
- 250 Enclosures for Electrical Equipment (1000 Volts Maximum)

National Fire Protection Association (NFPA)

- 70 National Electrical Code
- 90A Installation of Air Conditioning and Ventilating Systems
- 96 Installation of Equipment for the Removal of Smoke and Grease Vapors from Commercial cooking Equipment

Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA)

HVAC Duct Construction Standards—Metal and Flexible

Underwriters Laboratories, Inc. (UL)

- 705 Power Ventilators
- 834 Heating, Water Supply, and Power Boilers—Electric
- 900 Test Performance of Air Filter Units

Distribution Piping and Systems

Conform to Standards of Expansion Joint Manufacturer's Association

ACT

- 100 Fabrication of FRP CLAD/Composite Underground Storage tanks

American National Standards Institute (ANSI)

Boiler and Pressure Vessel Code (ASME)

Boilers and Pressure Vessels Code (ASTM)

- B31 Power Piping (ASME)
- B31.1 Power Piping
- B31.4 Liquid Petroleum Transportation Piping Systems
- B31.9 Building Services Piping (ASME)
- B40.1 Gauges, Pressure and Vacuum, Indicating Dial Type—Elastic Element
- D1.1 Structural Welding Code (AWS)
- Sec 9 Welding and Brazing Qualifications (ASME)

American Petroleum Institute (API)

Guide to Average Noise Criteria Curves

- C585 Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPA Systems)
- C921 Properties of Jacketing Materials for Thermal
- E84 Surface Burning Characteristics of Building Materials
- E96 Water Vapor Transmission of Materials
- American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE)
- Spec 12P Fiberglass Reinforced Plastic Tanks
- 650 Welded Steel Tanks for Oil Storage
- 1615 Installation of Underground Petroleum Storage System
- 1632 Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems
- 2000 Venting Atmospheric and Low Pressure Storage Tanks
- American Society for Testing and Materials (ASTM)

American Society of Mechanical Engineers (ASME)

Boiler and Pressure Vessel Code

- B31.8 Gas Transmission and Distribution Piping System

Compressed Gas Association (CGA)

- G-7 Compressed Air for Human Respiration
- P-2.1 Medical Surgical Vacuum Systems in Health Care Facilities
- V-5 Diameter Index Safety System Non Interchangeable Low Pressure Connections for Medical Gas Applications

Factory Mutual Engineering & Research Corp. (FM)

Factory Mutual System Approval Guide

Federal Specification (FS)

- W-C596 Electrical Power Connector, Plug, Receptacle, and Cable Outlet
- WW-V-35 Valve Ball
- WW-V-54 Valve, Gate, Bronze (125, 150 and 200 Pound, Screwed, Flanged, Solder End, For Land Use)

Manufacturers Standardization Society of the Valve and Fittings Industry (MSS)

- SP-69 Pipe Hangers and Supports Selection and Application

MIL-R-26557

Regulator, Pressure, Medical Gas Administration Apparatus

MIL-V-82026

Valves, Diaphragm, Stop

National Electrical Manufacturers Association (NEMA)

250 Enclosures for Electrical Equipment (1000 Volts Maximum)

National Fire Protection Association (NFPA)

13 Standard for the Installation of Sprinkler Systems
14 Standard for the Installation of Standpipe and Hose Systems
31 Installation of Oil Burning Equipment
50 Bulk Oxygen Systems at Consumer Sites
99 Standard for Health Care Facilities
225 Surface Burning Characteristics of Building Materials

Steel Tank Institute (STI)

STI-P3 Cathodically Protected Steel Underground Storage Tanks

Underwriters Laboratories, Inc. (UL)

58 Steel Underground Tanks for Flammable and Combustible Liquids
80 Steel Inside Tanks Oil-Burner Fuel
142 Steel Aboveground Tanks for Flammable and Combustible Liquids
723 Surface Burning Characteristics of Building Materials
1316 Glass-Fiber-Reinforced Plastic Underground Tanks for Petroleum Products

Cooling System

Air-Conditioning and Refrigeration Institute (ARI)

210/240 Unitary Air-Conditioning and Air-Source Heat Pump Equipment
210 Unitary Air-Conditioning Equipment
240 Air Source Unitary Heat Pump Equipment
270 Sound Rating of Outdoor Unitary Equipment
410 Forced-Circulation Air-Cooling and Air-Heating Coils
430 Central-Station Air-Handling Units
435 Application of Central-Station Air-Handling Units
520 Positive Displacement Refrigerant Compressors, Compressor Units, and
Condensing Units
610 Central System Humidifiers
750 Thermostatic Refrigerant Expansion Valves
760 Solenoid Valves for Use With Volatile Refrigerants

Air Movement and Control Association (AMCA)

99 Standards Handbook
500 Test Methods for Louver, Dampers, and Shutters
210 Laboratory Methods of Testing Fans for Rating Purposes
261 Directory of Products Licensed to Bear the AMCA Certified Ratings Seal
300 Test Code for Sound Rating Air Moving Devices

301 Method of Calculating Fan Sound Ratings from Laboratory Test Data
301 Method of Publishing Sound Ratings for Air Moving Devices

American National Standards Institute (ANSI)

Boilers and Pressure Vessels Code (ASME)
B31.5 Refrigeration Piping (ASME)
B31.9 Building Services Piping (ASME)
D1.1 Structural Welding Code, Steel (AWS)
MG 1 Motors and Generators (NEMA)

SEC 8D	Boilers and Pressure Vessels Code, Rules for Construction of Pressure Vessels (ASME)
SEC 9	Boilers and Pressure Vessels Code, Welding and Brazing Qualifications (ASME)
9	Load Rating and Fatigue Life for Ball Bearings (AFBMA)
11	Load Rating and Fatigue Life for Roller Bearings (AFBMA)
15	Safety Code for Mechanical Refrigeration (ASHRAE)
34	Number Designation of Refrigerants (ASHRAE)
70	National Electrical Code (NFPA)
90A	Energy Conservation in New Building Design (ASHRAE)
90A	Installation of Air Conditioning and Ventilation
207	Refrigerant-Containing Components and Accessories, Non-Electrical (UL)
250	Enclosures for Electrical Equipment (1000 volts maximum) (NEMA)
303	Refrigeration and Air-Conditioning Condensing, and Air-Source Heat Pump Equipment (UL)
303	Refrigeration and Air-Conditioning Condensing and Compressor Units (UL)
410	Forced-Circulation Air-Cooling and Air-Heating Coils (ARI)
429	Electrically Operated Valves (UL)
465	Central Cooling Air Conditioners (UL)
495	Refrigerant Liquid Receivers (ARI)
550	Centrifugal or Rotary Water—Chilling Packages
560	Absorption Water Chilling Packages
590	Standard for Reciprocating Water-Chilling Packages (ARI)
710	Liquid Line Dryers (ARI)
	Systems (NFPA)
1096	Electric Central Air Heating Equipment (UL)

American Society for Testing and Materials (ASTM)

ATC-105	Acceptance Test Code for Water Cooling Towers (CTI)
E84	Surface Burning Characteristics of Building Materials
E-84	Test Method for Surface Burning Characteristics of Building Materials
STD-201	Certification Standard (CTI)

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

14	Methods of Testing for Rating Positive Displacement Condensing Units
20	Methods of Testing for Rating Remote Mechanical Air-Cooled Refrigerant Condensers
23	Methods of Testing for Rating positive Displacement Refrigerant Compressors
52	Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter

American Society of Mechanical Engineers (ASME)

ATC-105	Acceptance Test Code for Water Cooling Towers (CTI)
B19.3	Safety Standard for Compressors for Process Industries
PTC-23	Atmospheric Water-Cooling Equipment
STD-201	Certification Standard (CTI)

Anti-Friction Bearing Manufacturers Association (AFBMA)

9	Load Ratings and Fatigue Life for Ball Bearings
11	Load Ratings and Fatigue Life for Roller Bearings
99	Standards Handbook

Cooling Tower Institute (CTI)

ATC-105	Acceptance Test Code for Water Cooling Towers
	Cooling Tower Institute
STD-201	Certification Standard

Federal Specification (FS)

TT-C-490 Cleaning Method and Pretreatment of Ferrous Surfaces for Organic Coatings

MIL-H-22547B

Heat Pump, Heating and Cooling (Unitary)

MIL-V-23450C

Valves, Expansion, Thermostatic, Refrigerant 12 and Refrigerant 22

National Electrical Manufacturers Association (NEMA)

MG1 Motors and Generators

250 Enclosures for Electrical Equipment (1000 Volts Maximum)

National Fire Protection Association (NFPA)

70 National Electrical Code

96 Installation of Equipment for the Removal of Smoke and Grease Vapors from Commercial cooking Equipment

Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA)

HVAC Duct Construction Standards—Metal and Flexible

Underwriters Laboratories, Inc. (UL)

Underwriters Laboratories

705 Power Ventilators

900 Test Performance of Air Filter Units

Conditioned Air System

Air-Conditioning and Refrigeration Institute (ARI)

610 Central System Humidifiers

630 Selection, Installation and Servicing of Humidifiers

610 Central System Humidifiers

630 Selection, Installation and Servicing of Humidifiers

Air Diffusion Council (ADC)

1062 Air Distribution and Control Device Test Code

Air Movement and Control Association (AMCA)

99 Standards Handbook

210 Laboratory Methods of Testing Fans for Rating purposes

300 Test Code for Sound Rating Air Moving Devices

301 Method of Calculating Fan Sound Ratings from Laboratory Test Data

American Conference of Governmental Industrial Hygienists (ACGIH)

Industrial Ventilation, A Manual of Recommended Practice

American National Standards Institute (ANSI)

410 Forced-Circulation Air-Cooling and Air-Heating Coils (ARI)

586 Test Performance of High Efficiency Particulate, Air Filter Units (UL)

900 Test Performance of Air Filter Units (UL)

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

- 52 Method of Testing Air Cleaning Devices Used in General Ventilation for
Removing Particulate Matter

MIL-STD-282

- Filter Units, Protective Clothing, Gas-Mask Components and Related Products:
Performance-Test Methods

National Fire Protection Association (NFPA)

- 90A Installation of Air Conditioning and Ventilation Systems

Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA) - HVAC

- Duct Construction Standards, Metal and Flexible
Round Industrial Duct Construction Standard
Rectangular Industrial Duct Construction Standard

Underwriters Laboratories, Inc. (UL)

- 181 Factory-Made Air Ducts and Connectors
214 Tests for Flame-Propagation of Fabrics and Films

Distribution Ductwork

Air-Conditioning and Refrigeration Institute (ARI)

- 650 Air Outlets and Inlets

Air Diffusion Council (ADC)

- 1062 Certification, Rating and Test Manual

Air Movement and Control Association (AMCA)

- 500 Test Method for Louvers, Dampers and Shutters

American National Standards Institute (ANSI)

- A112.21.1 Floor Drains
A112.22.2 Roof Drains
A112.26.1 Water Hammer Arrestors
90A Installation of Air Conditioning and Ventilating Systems (NFPA)
1011 Hose Connection Vacuum Breakers (ASSE)
1012 Backflow Preventers with Immediate Atmospheric Vent (ASSE)
1013 Backflow Preventers, Reduced Pressure Principle (ASSE)
1019 Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types (ASSE)

American Society for Testing and Materials (ASTM)

- C478 Precast Reinforced Concrete Manhole Sections
E84 Surface Burning Characteristics of Building Materials
E96 Water Vapor Transmission of Materials

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

- 70 Method of Testing for Rating the Air Flow Performance of Outlets and Inlets

National Fire Protection Association (NFPA)

- 255 Surface Burning Characteristics of Building Materials

Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA)
HVAC Duct Construction Standards Metal and Flexible
Low Pressure Duct Construction Standard

Underwriters Laboratories, Inc. (UL)
723 Surface Burning Characteristics of Building Materials

American Society for Testing and Materials (ASTM)

American Water Works Association (AWWA)
C506 Backflow Prevention Device Reduced Pressure Principle and Double Check Valve Types

Plumbing and Drainage Institute (PDI)
WH-201 Water Hammer Arresters

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
Handbook Fundamentals; Chapter 33—Duct Design
Handbook Equipment; Chapter 1—Duct Construction

National Fire Protection Association (NFPA)
90A Installation of Air Conditioning and Ventilating Systems
90B Installation of Warm Air Heating and Air Conditioning Systems
96 Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooling Equipment

Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA)
Low Pressure Duct Construction Standards
High Pressure Duct Construction Standards
Fibrous Glass Duct Construction Standards

Underwriters Laboratories, Inc. (UL)
33 Heat Responsive Links for Fire-Protection Service
181 Factory-Made Air Ducts and Connectors
555 Fire Dampers and Ceiling Dampers

Exhaust System

Air Movement and Control Association (AMCA)
99 Standards Handbook
210 Laboratory Methods of Testing Fans for Rating Purposes
300 Test Code for Sound Rating Air Moving Devices
301 Method of Calculating Fan Sound Ratings from Laboratory Test Data

American Conference of Governmental Industrial Hygienists (ACGIH)
Industrial Ventilation, A Manual of Recommended Practice

American National Standards Institute (ANSI)
C64 Refractories for Incinerators and Boilers (ASTM)
Z21.66 Electrically Operated Automatic Vent Damper Devices for Use with Gas-Fired Appliances
Z21.67 Mechanically Actuated Automatic Vent Damper Devices for Use with Gas-Fired Appliances

- Z21.68 Thermally Operated Automatic Vent Damper Devices for Use with Gas-Fired Appliances
- Z95.1 NFPA 31 Standard for the Installation of Oil Burning Equipment
- Z181.1 UL 959 Medium Heat Appliance Factory Built Chimneys
- Z223.1 NFPA 54 The National Fuel Gas Code

American Society for Testing and Materials (ASTM)
C401 Classification of Castable Refractories

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
Handbook, Equipment Volume, Chapter "Chimney, Gas, Vent, and Fireplace Systems"

National Fire Protection Association (NFPA)
82 Standard on Incinerators, Waste, and Linen Handling Systems and Equipment
211 Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances

Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA) - HVAC
Duct Construction Standards—Metal and Flexible
Rectangular Industrial Duct Construction
Round Industrial Duct Construction Standard

Underwriters Laboratories, Inc. (UL)
103 Standard for Factory Built Low Heat Chimneys
127 Standard for Factory Built Fireplaces
214 Tests for Flame-Propagation of Fabrics and Films
378 Standard for Draft Equipment
441 Standard for Gas Vents
641 Standard for Low Temperature Venting Systems

Testing and Balancing

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
Systems Handbook: Chapter 37, Testing, Adjusting, and Balancing

Associated Air Balance Council (AABC)
National Standards for Field Measurement and Instrumentation, Total System Balance

North Eastern Electricity Board (NEEB)
Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems

Swimming Pools

American Gas Association (AGA)
Z21.56 Gas Fired Pool Heaters

American Society of Mechanical Engineers (ASME)
SEC 8D Pressure Vessels

National Fire Protection Association (NFPA)

54 National Fuel Gas Code

70 National Electrical Code

National Sanitation Foundation (NSF)

50 Circulation System Components for Swimming Pools, Spas, or Hot Tubs

Underwriters Laboratories, Inc. (UL)

174 Household Electric Storage Tank Water Heaters

1081 Swimming Pool Pumps, Filters, and Chlorinators

1261 Electric Water Heaters for Pools and Tubs

1453 Electric Booster and Commercial Storage Tank Water Heaters

A-11. SPECIAL MECHANICAL EQUIPMENT

Fire Protection Systems

General

Factory Mutual Corporation (FM)

Approval Guide

National Fire Protection Association (NFPA)

13 Installation of Sprinkler Systems

14 Standpipe and Hose Systems

24 Installation of Private Fire Service Mains and Their Appurtenances

Underwriters Laboratories, Inc. (UL)

Fire Protection Equipment Directory

Fire Protection Piping

American Society of Mechanical Engineers (ASME)

B16.1 Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250, and 800

B16.3 Malleable Iron Threaded Fittings

B16.4 Cast Iron Threaded Fittings Class 125 and 250

B16.5 Pipe Flanges and Flanged Fittings

B16.9 Factory-Made Wrought Steel Buttwelding Fittings

B16.11 Forged Steel Fittings, Socket-welding and Threaded

B16.18 Cast Copper Alloy Solder-Joint Pressure Fittings

B16.22 Wrought Copper and Bronze Solder-Joint Pressure Fittings

B16.25 Buttwelding Ends

B36.10 Welded and Seamless Wrought Steel Pipe

Sec 9 Welding and Brazing Qualifications

American Society for Testing and Materials (ASTM)

A 47 Ferric Malleable Iron Castings

A 53 Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless

A 74 Cast Iron Soil Pipe and Fittings

A 120 Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses

A 135 Electric-Resistance-Welded Steel Pipe

- A 234 Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
- A 795 Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use
- B 75 Seamless Copper Tube
- B 88 Seamless Copper Water Tube
- B 251 Wrought Seamless Copper and Copper-Alloy Tube
- D 3309 Polybutylene (PB) Plastic Hot Water Distribution System
- F 438 Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40
- F 439 Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
- F 442 Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)
- F 493 Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe

American Welding Society (AWS)

- A5.8 Brazing Filler Metal
- D10.9 Specifications for Qualification of Welding Procedures and Welders for Piping and Tubing

American Water Works Association (AWWA)

- C110 Ductile-Iron and Gray-Iron Fittings 3 in. through 48 in., for Water and Other Liquids
- C151 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-lined Molds, for Water or Other Liquids

Fire Pumps

National Electrical Manufacturers Association (NEMA)

- MG-1 Motors and Generators
- 250 Enclosures for Electrical Equipment

National Fire Protection Association (NFPA)

- 20 Installation of Centrifugal Fire Pumps
- 37 Installation and Use of Stationary Combustion Engines and Gas Turbines

Underwriters Laboratories, Inc. (UL)

- 448 Pumps for Fire Protection Service
- 778 Motor Operated Water Pumps
- 1247 Diesel Engines for Driving Centrifugal Fire Pumps
- 1478 Fire Pump Relief Valves

A-12. INTERIOR ELECTRICAL

General

National Fire Protection Association (NFPA)

- 70 National Electrical Code

International Conference of Building Officials (ICBO)

- Uniform Electrical Code

Institute of Electrical and Electronic Engineers (IEEE)
C2 National Electrical Safety Code

Service and Distribution Systems

Conduit

American National Standards Institute (ANSI)

- C80.1 Rigid Steel Conduit—Zinc Coated
- C80.3 Electrical Metallic Tubing—Zinc Coated
- C80.5 Rigid Aluminum Conduit

Underwriters Laboratories, Inc. (UL)

- 1 Flexible Metal Conduit
- 3 Flexible Nonmetallic Tubing for Electric Wiring
- 6 Rigid Metal Conduit
- 360 Liquid-Tight Flexible Steel Conduit
- 514B Fittings for Conduit and Outlet Boxes
- 651 Schedule 40 and 80 Rigid PVC Conduit
- 651A Type EB and A Rigid PVC Conduit and HDPE Conduit
- 797 Electrical Metallic Tubing
- 1242 Intermediate Metal Conduit
- 1660 Liquid-Tight Flexible Nonmetallic Conduit

Institute of Electrical and Electronics Engineers (IEEE)

- 241 Recommended Practice for Electric Power Systems in Commercial Buildings

National Electrical Manufacturers Association (NEMA)

- FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
- RN 1 Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
- TC 2 Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
- TC 3 PVC Fittings for Use with Rigid PVC Conduit and Tubing
- TC 6 PVC and ABS Plastic Utilities Duct for Underground Installation
- TC 8 Extra-Strength PVC Plastic Utilities Duct for Underground Installation
- TC 9 Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation
- TC 10 PVC and ABS Plastic Communications Duct and Fittings for Underground Installation
- TC 12 Corrugated Polyvinyl Chloride (PVC) Coilable Plastic Utilities Duct
- TC 13 Electrical Nonmetallic Tubing (ENT)
- TC 15 Corrugated Polyvinyl Chloride (PVC) Fiber Optic Innerduct

National Electrical Contractors Assn. (NECA)

Standard of Installation

Surface Raceways

National Electrical Contractors Association (NECA)

Standard of Installation

National Electrical Manufacturers Association (NEMA)

- WD 6 Wiring Device Configurations

Cable Trays

National Electrical Manufacturers Association (NEMA)

- FG 1 Fiberglass Cable Tray Systems
- VE 1 Metallic Cable Tray Systems

Ductbank

American National Standards Institute (ANSI)

- C80.1 Rigid Steel Conduit—Zinc Coated

American Society for Testing and Materials (ASTM)

- A 48 Gray Iron Castings
- A 123 Zinc (Hot Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strips
- A 153 Zinc Coating (Hot Dip) on Iron and Steel Hardware
- A 569 Steel, Sheet and Strip, Carbon (0.15 Maximum Percent), Hot-Rolled, Commercial Quality

National Electrical Manufacturers Association (NEMA)

- FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
- TC 2 Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
- TC 3 PVC Fittings for Use with Rigid PVC Conduit and Tubing
- TC 14 Filament-Wound Reinforced Thermosetting Resin Conduit and Fittings

Wires and Cables

Occupational Safety and Health Administration (OSHA)

- Subpart S Electrical
- 1910.304 Wiring Design and Protection

Underwriters Laboratories, Inc. (UL)

- 1 Flexible Metal Conduit
- 4 Armored Cable
- 6 Rigid Metal Conduit
- 44 Rubber-Insulated Wires and Cables
- 62 Flexible Cord and Fixture Wire
- 83 Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
- 115 Wires With Asbestos or Asbestos and Varnished Cloth or Tape Insulation
- 133 Wires and Cables With Varnished-Cloth Insulation
- 486C Splicing Wire Connectors
- 493 Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
- 719 Nonmetallic-Sheathed Cables
- 797 Electrical Metallic Tubing
- 854 Service-Entrance Cables
- 1063 Machine-Tool Wires and Cables
- 1242 Intermediate Metal Conduit
- 1277 Proposed First Edition of the Standard for Electrical Power and Control Tray Cables With Optional Optical-Fiber Members
- 1569 Metal-Clad Cables
- 1581 Reference Standard for Electrical Wires, Cables, and Flexible Cords

Electrical Construction Materials Directory

Armored Cable (AWEZ)
Asbestos-Insulated (ZHNV)
Asbestos-Varnished-Cloth (ZIBT)
Metal-Clad Cable (PJAZ)
Nonmetallic Sheathed Cable (PWVZ)
Rubber-Insulated (ZKST)
Service Entrance Cable (TYLZ)
Thermoplastic-Insulated (ZLGR)
Varnished Cloth (ZLTZ)

Institute of Electrical and Electronics Engineers (IEEE)

241 Recommended Practice for Electric Power Systems in Commercial Buildings
563 Guide on Conductor Self-Damping Measurements
590 Cable Plowing Guide
634 Cable Penetration Fire Stop Qualification Test

National Electrical Manufacturers Association (NEMA)

WC 2 Steel Armor and Associated Coverings for Impregnated-Paper Insulated Cables
WC 3 Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
WC 4 Varnished-Cloth-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
WC 5 Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
WC 7 Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
WC 8 Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
WC 26 Wire and Cable Packaging

Boxes

National Electrical Manufacturers Association (NEMA)

FB 1 Fittings and Supports for Conduit and Cable Assemblies
OS 1 Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
OS 2 Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports
250 Enclosures for Electrical Equipment (1000 Volts Maximum)

Wiring Devices

National Electrical Manufacturers Association (NEMA)

WD 1 General Purpose Wiring Devices
WD 6 Wiring Device Configurations

Cabinets, Enclosures

National Electrical Manufacturers Association (NEMA)

250 Enclosures for Electrical Equipment (1000 Volts Maximum)
ICS 4 Terminal Blocks for Industrial Control Equipment and Systems

Supporting Devices

National Electrical Contractors Association (NECA) Standard of Installation

Switchgear, Switches

American National Standards Institute (ANSI)

- C12.1 Code for Electricity Metering
- C39.1 Electrical Analog Indicating Instruments
- C57.13 Instrument Transformers

National Electrical Manufacturers Association (NEMA)

- AB 1 Molded Case Circuit Breakers and Molded Case Switches
- MG 1 Motors and Generators
- ICS 1 General Standards for Industrial Control Devices, Controllers, and Assemblies
- ICS 2 Standards for Industrial Control Devices, Controllers, and Assemblies
- ICS 6 Enclosures for Industrial Controls and Systems
- KS 1 Enclosed Switches
- PB 2 Deadfront Distribution Switchboards
- PB 2.1 Proper Handling, Installation, Operation, and Maintenance of Deadfront Switchboards Rated 600 Volts or Less

Underwriters Laboratories, Inc. (UL)

- 198C High-Interrupting Capacity Fuses; Current Limiting Type
- 198E Class R Fuses

Transformers

National Electrical Manufacturers Association (NEMA)

- ST 1 Specialty Transformers
- ST 20 Dry Type Transformers for General Applications

Panelboards, Circuitbreakers

National Electrical Manufacturers Association (NEMA)

- AB 1 Molded Case Circuit Breakers and Molded Case Switches
- ICS 2 Standards for Industrial Control Devices, Controllers, and Assemblies
- KS 1 Enclosed Switches
- PB 1 Panelboards
- PB1.1 Instructions for Safe Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less

Power Systems

Backup Power Systems

National Electrical Manufacturers Association (NEMA)

- AB 1 Molded Case Circuit Breakers and Molded Case Switches
- MG 1 Motors and Generators
- 250 Enclosures for Electrical Equipment (1000 Volts Maximum)

Institute of Electrical and Electronics Engineers (IEEE)

- 446 Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications
- 493 Recommended Practice for Design of Reliable Industrial and Commercial Power Systems

Lighting Systems

General

Illumination Engineering Society (IES)

Lighting Design Handbook

Luminaires

American National Standards Institute (ANSI)

- C78.379 Electric Lamps—Incandescent and High-Intensity Discharge Reflector Lamps—Classification of Beam Patterns
- C82.1 Ballasts for Fluorescent Lamps—Specifications
- C82.4 Ballasts for High-Intensity Discharge and Low Pressure Sodium Lamps (Multiple Supply Type)

National Electrical Manufacturers Association (NEMA)

NEMA WD 6 Wiring Devices-Dimensional Requirements

Lightning Protection Systems

National Fire Protection Association (NFPA)

78 Lightning Protection Code

Underwriters Laboratories, Inc. (UL)

- 96 Lightning Protection Components
- 96A Installation Requirements for Lightning Protection Systems

A-13. SPECIAL INTERIOR ELECTRICAL

General

National Fire Protection Association (NFPA)

70 National Electrical Code

International Conference of Building Officials (ICBO)

Uniform Electrical Code

Institute of Electrical and Electronic Engineers (IEEE)

C2 National Electrical Safety Code

Alarm Systems

Fire Alarm and Smoke Detection

National Fire Protection Association (NFPA)

- 72A Installation, Maintenance, and Use of Local Protective Signaling System for Guard's Tour, Fire Alarm, and Supervisory Service
- 72B Installation, Maintenance, and Use of Auxiliary Protective Signaling System for Fire Alarm Service
- 72C Installation, Maintenance, and Use of Remote Station Protective Signaling System
- 72E Automatic Fire Detectors
- 72G Notification Appliances for Protective Signaling Systems
- 72H Guide for Test Procedures for Protective Signaling Systems

Intrusion Detection and Security

National Fire Protection Association (NFPA)

- 72G Notification Appliances for Protective Signaling Systems
- 72H Guide for Test Procedures for Protective Signaling Systems

APPENDIX B: Recommended Design Requirements Format

This Appendix provides a representative list of design requirements for a Third Party Contract RFP. This list must be tailored to each specific project by adding items, amending items, and omitting items that do not apply. It is anticipated that only selected items will be appropriate for any given Third Party Contract RFP.

Facility Description

Provide a general description of the facility's purpose and functions. Describe the following:

- Functions and activities taking place in the facility; inputs, products.
- Occupancy characteristics; numbers and types of personnel, schedules, special capabilities or limitations. Indicate whether handicapped accessibility provisions will apply.
- Organizational features of the Army tenant that may affect function and design.
- External activities, relationships, or constraints that will affect the facility's activities and function.
- For facilities located on-post, master planning considerations that will affect the facility's design.
- Any special objectives to be achieved with the facility.

Site Data

If the facility is to be located on private land, the Third Party Contractor will be responsible for obtaining all necessary site data. If the facility is to be located on-post or on Government-owned land, include all existing site drawings and data as they would appear in conventional construction documents.

Site Design Parameters

Describe functions and activities that will govern site design. Descriptions may include, but need not be limited to:

- Site security requirements; protection, access control, surveillance, observation, lighting, alarms
- Safety considerations; vehicular circulation control, pedestrian protection, lighting
- Visual prominence on the site; facility identity, visibility, privacy, desired image or appearance to the public
- Location, orientation; environmental considerations, site utilization, interrelationships with off-site activities
- Vehicular circulation considerations; access, parking, building service, circulation patterns
- Parking; numbers of spaces, proximity and accessibility to building features

- Pedestrian circulation considerations; schedules and occupant arrivals and departures, access control and accessibility, circulation patterns
- For facilities located on-post, master planning considerations that will affect the facility's design
- Other site design considerations.

Building Design

Describe the overall considerations and objectives for the building's design. Include considerations for appearance, image to the public, and architectural presence. For facilities located on-post, describe requirements relative to the local architectural environment.

Describe overall objectives for the facility's interior environments. Include considerations for design and material quality, workplace quality and mission performance, and occupant safety as they apply to the Army tenant's mission and function.

Provide a summary of spaces and areas. These may be rooms, areas, functionally-related areas or activities, or other subdivisions appropriate to the Army tenant and function. Indicate space/area titles and floor area requirements, if appropriate. This information may be conveyed in tabular format.

Describe the spatial relationships appropriate for the Army tenant's activities and organization. Indicate necessary proximities, adjacencies, and functional interrelationships. Describe requirements for access control, observation, and other security considerations. This information may be conveyed in tabular, matrix, or diagrammatic format. Describe any other overall building programmatic requirements in verbal or tabular format.

For each space/area, provide a schedule of requirements. This schedule should include all information about activities, equipment, and occupancy or personnel necessary to design a responsive facility. The schedule must be tailored to the specific project conditions and may include, but need not be limited to:

Space/Area Title:

Description of Function/Activity:

Area Requirements:

- Floor area requirements (or other parameters that will enable the Third Party Contractor to calculate the appropriate facility scope)
- Requirements for minimum or maximum plan and vertical dimensions or clearances
- Other critical area, dimensional, or spatial requirements or considerations.

Description of Personnel, Occupancy: Number and types of personnel, personal requirements.

Acoustic Environment:

- Security
- Privacy
- Occupational safety
- Occupant comfort and mission performance
- Sound transmission among spaces
- Noise reduction within spaces.

Finishes: Consideration for special finishes critical to mission performance (i.e., chemical resistance, slip resistance, etc.)

Furnishes/Specialties:

- Description of casework, furnishings, and specialties requested under the Third Party Contract
- For Government furnished items—dimensions, clearance requirements, and other information that will affect the facility's design

Equipment:

- Description of equipment requested under the Third Party Contract
- For Government-installed equipment—description of equipment, dimensions, clearance requirements and other information that will affect the facility's design
- For Government-installed equipment—requirements for anchorage, power, exhaust or waste discharge, and other support utilities necessary for the equipment's function.

Mechanical Environment:

- Interior design temperatures, air movement, humidity, and other appropriate interior environmental requirements
- Considerations for mechanical systems' zone organization and control, as appropriate
- Requirements for potable water, hot water, drainage and special equipment (such as eye washes, emergency showers, fire suppression, toxic substance control, etc).

Note Mechanical requirements should reference the appropriate industry code and design criteria and OSHA criteria wherever possible. Unique or Army-specific criteria should be imposed only where critical to mission performance and not available elsewhere.

Electrical Environment:

- Requirements for type and location of power sources relative to the Army tenant's equipment, functions, and activities
- Special power requirements (uninterruptible power, lightning protection, surge protection, etc.)
- Illumination requirements relative to task performance
- Requirements for electronic and communication systems, and whether these are to be Government-furnished or installed under the Third Party Contract
- For Government-installed systems, indicate requirements for cable routing, support, and access and other interface features to be provided by the Third Party Contractor
- Requirements for alarm, audio/video, time, and other electronic systems.

Note: Electrical requirements should reference the appropriate industry code and design criteria and OSHA criteria wherever possible. Unique or Army-specific criteria should be imposed only where critical to mission performance and not available elsewhere.

Special Requirements: Description of requirements for other special features such as vibration isolation, security, clean environment, environmental isolation, etc.

Remarks: Any additional information not included above that is necessary to design a responsive facility.

Life-Cycle Considerations

The Army tenant and USACE construction agent must give consideration to the mission, occupant, and functional changes that will be likely throughout the duration of the contract. Although it is unlikely that specific requirements will be known during RFP development, prudent practice suggests that flexibility and adaptability should be addressed during the facility's design. In a Third Party Contract, the contractor is in a similar situation as a speculative developer, as is the Army to a commercial tenant. It will be in the best interests of both the Army and the Third Party Contractor to reduce the expense and disruption involved in upgrading or modifying the facility as functions and activities change. The Third Party Contractor can then determine the initial and life-cycle cost balance appropriate for his/her economic objectives.

Describe considerations for facility adaptability in terms of the Army tenant's functions and activities. Address the following as they would apply to the specific project:

- Space configuration: adaptability of interior space arrangement; potential for building expansion
- Structural capacity: ability to support equipment and other items; potential change in occupancy type and live loading conditions
- Equipment accommodation: accessibility for equipment removal and replacement, anchorage, power requirements, exhaust or waste discharge conditions, and other support utilities necessary for the equipment's function

- Power distribution; capacity for future demand; accessibility to AC power sources, circuit organization and control considerations
- Lighting: potential for change in required lighting levels, distribution, power capacity
- Electronics/communications: capacity and accessibility for cable routing, distribution; protection/shielding from electronic interference
- Plumbing: capacity for future demand; supply and DWV distribution, accessibility, control
- HVAC; capacity for future demand; distribution, accessibility; zone organization and control.

ACRONYMS

TPC	Third Party Contracting
PSF	Private Sector Funding
MCA	Military Construction, Army
RFP	Request for Proposal
USACE	U.S. Army Corps of Engineers
AE	Architect/Engineer
AEI	Architectural and Engineering Instruction
HQUSACE	Headquarters, U.S. Army Corps of Engineers
DCIS	Defense Criteria Information System
USC	U.S. Code
FAR	Federal Acquisition Regulation
MFH	Military Family Housing
DOD	Department of Defense
FMHCSS	Federal Manufactured Housing Construction and Safety Standards
NFPA	National Fire Protection Association
O&M	Operation and Maintenance
TM	Technical Manual
CEGS	Corps of Engineer Guide Specification
DEH	Directorate of Engineering and Housing
HVAC	Heating, Ventilation, and Air-Conditioning
UPS	Uninterruptable Power Supply
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ANSI	American National Standards Institute
BOCA	Building Officials and Code Administrators
ICBO	International Council of Building Officials
SBCCI	Southern Building Code Congress, Inc.
CACES	Corps Automated Cost-Estimating System
TV	Television

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